Attachment A

Health and Safety Plan

RFI Work Plan Implementation –
Groundwater and Soil Sampling / Disturbance
Commonwealth Oil Refining Company
Peñuelas, Puerto Rico

August 2013

NewFields

CONTACT INFORMATION

CORCO FACILITY CONTACTS:

Name:	Mr. Roberto Gratacós
Position:	Senior Vice President Operations, Project Manager
Work Address:	Carr. 127, Km. 17.3, Peñuelas, PR 00624
Home Address:	Urb.Rio Canas, Calle Cristal 1726, Ponce, PR 00728-1737
Emergency Phone Number:	Home 787-840-4989
Project Specific Response Training Experience:	Senior officer onsite, Emergency Response Team Coordinator/Qualified Individual (QI) under EPA's Facility Response Plan (FRP).

Name:	Mr. Rolando H. Méndez
Position:	Environmental Coordinator and Project Coordinator
Work Address:	Carr. 127, Km. 17.3, Peñuelas, PR 00624
Home Address:	2737 Corozo St. Urb. Los Caobos, Ponce, PR 00716-2734
Emergency Phone Number:	Home 787-844-8551
Project Specific Training/ Experience:	Hazwoper Trained/Trainer; Former Site Project Manager for RFI and IMS under Corrective Action, and Site Coordinator for various Closure Plans for Phillips Puerto Rico Core Inc.'s site in PR

Name:	To be designated by CORCO)
Position:	(To be designated) and Site Safety Officer
Work Address:	Carr. 127, Km. 17.3, Peñuelas, PR 00624
Home Address	(Pending)
Emergency Phone Number:	Home (Pending)
Project Specific Response Training Experience:	(Pending)

SUBCONTRACTORS' CONTACTS

Name:	(To be designated by CORCO)
Position:	(To be designated) and Project Coordinator - Subcontractor 1
Work Address:	Carr. 127, Km. 17.3, Peñuelas, PR 00624
Home Address	(Pending)
Emergency Phone Number:	Home (Pending)
Project Specific Response	
Training Experience:	(Pending)

Name:	(To be designated by CORCO)
Position:	(To be designated) and Project Coordinator - Subcontractor 2
Work Address:	Carr. 127, Km. 17.3, Peñuelas, PR 00624
Home Address	(Pending)
Emergency Phone Number:	Home (Pending)
Project Specific Response	
Training Experience:	(Pending)

EMERGENCY NOTIFICATION PHONE LIST

WHOM TO NOTIFY

Date of Last Update: November 2011

The following "EMERGENCY CALL-OUT PROCEDURES" should be used to notify qualified individuals, agencies and other pertinent organizations in the event of spill, fire, personnel injury, or plant property damage.

Telephone - Supervisor on Duty

Site Telephone Numbers:	787-843-3030 / 787-836-1350
Fax:	787-836-1269

CORCO's F.M. Radio Communication

F-1 Frequencies:	158.415 Megahertz (Receiving)
	153.260 Megahertz (Transmitting)
F-2 Frequencies:	158.280 Megahertz (Receiving)
	153.380 Megahertz (Transmitting)

CORCO's Marine Radio Communication System

Marine VHF Frequency Channels:	6, 9, 11, 14, 16, 22, and 69

QUALIFIED INDIVIDUAL

1. Eng. Roberto Gratacós - Senior Vice President Operations

Telephone:

Office:	787-836-1350, ext. 201
Cellular:	787-312-2569
Home:	787-840-4989
Beeper Unit:	787-417-4718

ALTERNATE QUALIFIED INDIVIDUAL

2. Francisco Rodriguez - Operations Manager

Telephone:

Office:	787-836-1350, ext. 223
Home:	787-843-1823
Beeper Unit:	787-417-4290

EMERGENCY RESPONSE TEAM COORDINATORS

Notify in the following order:

3. Israel Mercado - Operations Supervisor

Telephone:

Office:	787-836-1350, ext. 241/227
Home:	787-290-8597
Beeper Unit:	787-386-2549

Proship

4. Ramón Ramos - Proship Managing Director

Telephone:

Office:	787-836-1350, ext. 247
	787-836-1913
Cellular:	787-313-7435
Home:	787-844-5606
Beeper Unit:	787-417-3723

Maintenance

5. Eng. Benigno Morales - Maintenance Manager

Telephone:

Office:	787-836-1350, ext. 216
Cellular:	787-462-2181
Beeper Unit:	787-419-7100

6. Vicente Casiano - Maintenance Superintendent

Telephone:

Office:	787-836-1350, ext. 232
Home:	787-836-0391
Beeper Unit:	787-419-8021

Laboratory

7. Raúl Santos - Chief Chemist

Telephone:

Office:	787-836-1350, ext. 233
Home:	787-260-5217
Beeper Unit:	787-417-2572

Security

8. Bernardo Flores - Security Supervisor

Telephone:

Office:	787-836-1350, ext. 205
Home:	787-825-1844
Beeper Unit:	787-417-4725

9. Osvaldo Irizarry - Chief Security Guard

Telephone:

Office:	787-836-1350, ext. 237
Home:	787-856-2844
Beeper Unit:	787-417-4869

Environmental Protection

10. Edert B. Ortiz Alfaro - Manager

Telephone:

Office:	787-836-1350, ext. 243
Home:	787-813-1185

11. Rolando Mendez - Environmental Coordinator

Telephone:

Office:	787-836-1350, ext. 234
Home:	787-844-8551
Beeper Unit:	787-419-4254

12. Héctor Fernández - Purchasing Agent

Telephone:

Office:	787-836-1350, ext. 202/203
Home:	787-843-8644
Beeper Unit:	787-419-2705

FEDERAL, STATE, AND LOCAL AGENCIES/EMERGENCY ORGANIZATIONS

(TO BE CALLED AS NEEDED)

Press # followed by Speed Code Number shown in parenthesis for each organization below

Updated November 2011

(For spills that exceed RQs, or cause sheen in navigable waters, call immediately)

NATIONAL RESPONSE CENTER (ALSO USEPA REGION 2 24 HRS. EMERGENCY RESPONSE HOTLINE)	1-800-424-8802		(23)
U.S. COAST GUARD-RESPONSE COMMAND (24 HRS.)	787-289-2041		(21)
Sector S.J. Prevention Operations Command Inspection Department	787-729-2376		(22)
	787-729-6706	Fax	
	787-284-4738	Ponce	
ENVIRONMENTAL QUALITY BOARD (EQB)	787-840-4070	Ponce	(25)
	787-842-2993	Fax	
	787-767-8181	San Juan	(26)
	787-766-0150	Fax	
ENVIRONMENTAL PROTECTION AGENCY (EPA) Caribbean Field Office	787-977-5870		(27)
	787-289-7104	Fax	
OSC: Angel Rodriguez	787-977-5830		(28)
OSC: Geoffrey Garrison	787-977-5820		(29)
NATURAL AND ENVIRONMENTAL RESOURCES DEPARTMENT	787-844-4660 787-844-4051 787-844-6693	Ponce	(30)

	787-844-6733	Fax	
	787-724-8774	San Juan	(31)
PUERTO RICO PORTS AUTHORITY	787-842-5064		(32)
STATE FIRE PROTECTION SERVICES OF PR:			
Guayanilla	787-835-2330		(33)
Peñuelas	787-836-2330		(34)
Ponce	787-343-2330		(35)
Yauco	787-856-2330		(36)
STATE EMERGENCY MANAGEMENT AGENCY			
Central (Radio Operator)	787-724-0124		(38)
Peñuelas	787-836-1361		(39)
	787-836-6971	Fax	
Ponce (Zone 5)	787-844-8272		(40)
Guayanilla	787-835-3713	Fax	
EMERGENCY MEDICAL SYSTEMS (Ambulance & Paramedics - Ponce)	787-343-2550		(41)
HOSPITALS:			
Hospital Metropolitano Dr. Tito Mattei (Yauco)	787-856-2105		(48)
Hospital Dr. Pila (Ponce)	787-848-5600		(49)
Hospital Damas (Ponce)	787-840-8686		(50)
Hospital San Cristobal	787-848-2100		(51)
Hospital San Lucas I	787-840-4545		(52)
STATE POLICE:			
Command Center (Ponce)	787-343-2020		(42)
State Police (Peñuelas)	787-836-2020		(43)

LOCAL EMERGENCY PLANNING COMMITTEE (LEPC): See EQB Ponce		
CIMAO (Mutual Aid)	787-843-4115	(44)
(C/O Demaco) (24 hrs.)	787-835-2222	
	787-835-2315	
LOCAL WATER SUPPLY SYSTEM:		
CORCO Well Water System	787-836-1350	
WEATHER REPORT:		
National Weather Service	787-253-4589	(45)
	787-253-4586	

(For Community Information)

LOCAL TELEVISION/RADIO STATION:		
WSUR TV, Channel 9 (Univision)	787-843-0910	(46)
WPPC Radio Felicidad – Peñuelas	787-836-1570	(47)

(For Technical Assistance)

CHEMTREC	1-800-424-9300	(24)
EPA - SUPERFUND/RCRA HOTLINE	1-800-424-9346	(37)
EPA - T.S..C.A. HOTLINE (08:30 - 17:00 hrs EST, Monday-Friday)	202-554-1404	(93)
U.S. FISH AND WILDLIFE (Boqueron Refuge)	787-851-7297	

Approvals

Project Manager:

Roberto Gratacós _____ _____

Name (Printed) of Project Manager: (Date)

_____

Signature of Project Manager

Project Coordinator (CORCO)

Rolando Mendez _____ _____

Name (Printed) Project Coordinator (Date)

_____

Signature of Project Coordinator

Site Safety Officer

_____ _____

Name (Printed) of Site Safety Officer (Date)

_____

Signature of Site Safety Officer

Subcontractor (1) Project Coordinator

_____ _____

Name (Printed) of Project Coordinator – Subcontractor (1) (Date)

_____

Signature of Project Coordinator – Subcontractor (1)

Subcontractor (2) Project Coordinator

_____ _____

Name (Printed) of Project Coordinator – Subcontractor (2) (Date)

_____

Signature of Project Coordinator – Subcontractor (2)

This Health and Safety Plan is valid only for sample collecting and maintenance activities, within CORCO's Main Site and its surrounding facilities ("affected activities"). Project specific health and safety plans will be required for those projects that would trigger the applicability of requirements under 29 CFR 1910.120, and/or remediation work normally subject to requirements under RCRA, as determined by the CORCO project manager.

Table of Contents

List of Appendices

List of Figures

Glossary of Terms, Acronyms, and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
^{o}C	Degrees Centigrade
CAA	Clean Air Act
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cc	Cubic centimeter
CDC	U.S. Centers for Disease Control
CFR	Code of Federal Regulations
CNS	Central Nervous System
COC	Contaminants of Concern
CPR	Cardiopulmonary Resuscitation
CRZ	Contaminant Reduction Zone
CTPV	Coal Tar Pitch Volatiles
CWA	Clean Water Act
DHHS	Department of Health and Human Services
DOT	Department of Transportation
EPA	United States Environmental Protection Agency
eV	Electron volts
f/cc	Fibers per Cubic Centimeter
FDA	Food and Drug Administration
FID	Flame Ionization Detector
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
^{o}F	Degrees Fahrenheit

g	grams
GFI	Ground Fault Interrupters
GMC-H	Gas Mark Canister
HAZWOPER	Hazardous Waste Operations and Emergency Response Standard
HCH	Hexachlorocyclohexanes
HEPA	High Efficiency Particular Air (Filter)
HSM	Health and Safety Manager
HSP	Health and Safety Plan
HUD	U.S. Department of Housing and Urban Development
IARC	International Agency for Research on Cancer
IATA	International Air Transportation Association
IDLH	Immediately Dangerous to Life and Health
LEL	Lower Explosive Limit
LFL	Lower Flammable Limit
MCL	Maximum Contaminant Levels
MCLG	Maximum Contaminant Level Goal
MSDS	Material Safety Data Sheet
m	meter
µg/dL	micrograms per deciliter
mg/L	milligrams per liter
mg/M^3	milligram per cubic meter
mm	millimeter
MSA	Mine Safety Appliances Co.
MSDS	Material Safety Data Sheet
N/A	Not Available
NIOSH	National Institute for Occupational Safety and Health
OBZ	Operator's Breathing Zone
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PAH	Polycyclic Aromatic Hydrocarbons
PC	Project Coordinator
PCBs	Polychlorinated Biphenyls
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PM	Project Manager
PNA	Polynuclear Aromatic Hydrocarbons
PPE	Personal Protective Equipment
ppm	parts per million
PVC	Poly-vinyl Chloride
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit
RMP	Risk Management Program Rule
RPAR	Rebuttable Presumption Against Registration
RQ	Reportable Quantity
SAR	Supplied Air Respirator
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-Contained Breathing Apparatus

SDWA	Safe Drinking Water Act
SSO	Site Safety Officer
SSR	Subcontractor's Safety Representative
STEL	Short Term Exposure Limit
SVOC	Semi-Volatile Organic Compound
TLV	Threshold Limit Value
TRI	Toxic Release Inventory
TWA	Time Weighted Averages
UEL	Upper Explosive Limit
USDA	U.S. Department of Agriculture

1.0 SUMMARY

Based on a historical review of facility operations, soils and subsoil's within the sites to which this plan applies, soils and subsoil's within such sites may have been impacted by petroleum products typical of a petroleum refinery/petrochemical processing facilities, which may have included crude oil, diesel, leaded gasoline, unleaded gasoline, No. 6 fuel oil and No. 2 fuel oil, among others. Skin contact with potentially contaminated media will be minimized by wearing personal protective clothing as described in Section 7. Air monitoring, engineering controls and the use of respiratory protection will minimize inhalation of vapors during the "affected activites" if action levels (see Section 6.1) are exceeded. Ingestion of contaminated materials will be minimized by good personal hygiene during decontamination (i.e., thoroughly washing face and hands with soap and water before eating or drinking).

Air monitoring conducted before and during "affected activities" will be performed in accordance with Section 6 of this HSP, which summarizes the air monitoring procedures.

2.0 PURPOSE & APPLICABILITY

The purpose of this Health and Safety Plan (HSP) is to assign responsibilities, establish personal protection standards and mandatory safety procedures, and provide for contingencies that may arise during CORCO's or CORCO's subcontractors' construction and maintenance operations which involve excavations and/or the disturbance of soil or subsoil's ("affected activities"). This plan complies with, Federal Health and Safety Regulations as set forth in 29 CFR 1910 and 1926; and will be used by CORCO personnel and contractors as a supplement to such rules, regulations, and guidance. This plan will also constitute the minimum requirements for CORCO's subcontractors' Health & Safety Plans during their work on the Site.

Changing and/or unanticipated Site conditions may require modification of this HSP in order to maintain a safe and healthful work environment. Any proposed changes to this plan should be reviewed with the CORCO Project Manager and Coordinator, or their designees, prior to their implementation. If this is not feasible, the Project Coordinator (PC) or Project Manager (PM) may modify the plan and record all changes in the field log book. Under no circumstances will modifications to this plan conflict with federal, state, or local health and safety regulations.

CORCO will provide a copy of this Health and Safety Plan to each Site subcontractor to be engaged in, and/or which could be exposed by, "affected activities" in order to fulfill its obligation under 29 CFR 1910.120(b)(iv) to inform subcontractors of Site hazards. Each CORCO subcontractor will in turn provide a Health and Safety Plan that addresses the activities of its employees relative to this project, consistent with the minimum requirements stipulated in this document.

3.0 SITE HISTORY

The Commonwealth Oil Refining Company (CORCO) operated an integrated petroleum refinery at the Peñuelas, Puerto Rico location from 1952 to approximately 1982 when manufacturing operations ceased. In 1976, the company entered bankruptcy and CORCO assets were acquired out of bankruptcy by holders of company bonds in the early 1980s. The new owners converted the Facility operations in the early 1980s to a terminal and storage business.

In a letter dated September 23, 2004, U.S. EPA Region 2 requested CORCO to submit determinations for two Environmental Indicators (EI). The first EI was Current Human Exposure Under Control (CA 725), which was submitted to EPA in a report dated September 23, 2005. The second EI was Migration of Contaminated Groundwater Under Control (CA 750), which will be submitted at a later date. The first EI determination (CA 725) was that current human exposures are under control. One component of this determination was that a health and safety plan (HSP) would be implemented to cover all site workers (employees and contractors) performing routine maintenance and construction activities involving soil disturbance ("affected activities"). This HSP was developed for this purpose. Any remediation or RCRA-related work would be addressed by project specific HSP's.

This plan applies to all CORCO facilities as defined in the EI report including CORCO Main Site, Western Lagoons, Flores Park, Oxochem / Caribe Isoprene Corporation, and the Eastern Oil Lagoons.

4.0 GENERAL SAFETY AND HEALTH RULES

The following general rules have been formulated in order to prevent workplace accidents at the CORCO facility. Compliance with each one of these rules will guarantee you a safe workplace. These rules *DON'T CONSTITUTE ALL THE NEEDED SAFETY AND HEALTH REQUIREMENTS*. Your supervisor will provide you with specific tools and procedures according to your work area and specific tasks.

1. Safety shoes or boots are required at every area in the facility. Open shoes or canvas are prohibited.

2. Food storage and intake is not permitted in any operation.

3. Obey safety signs and labels such as "Emergency Exit", "PPE Required", ''Do Not Enter", "Authorized Personnel Only", "Do Not Smoke" or "Speed Limits".

4. Process and transfer equipment must be used only by authorized personnel.

5. Possession of firearms, controlled substances or alcohol is strictly prohibited in the facility.

6. Law enforcement personnel are the only ones authorized for firearms possession.

7. Do not come to work under the effects of alcohol or controlled substances.

8. Sexual harassment is a prohibited conduct at the CORCO facility.

9. All visitors and contractors must receive a safety orientation before entering to process or transfer areas, and a CORCO escort must be assigned.

10. Running, fighting, joking and gambling are strictly prohibited in the facility.

11. All accidents/incidents must be immediately reported to the supervisor.

12. Every container must be appropriately labeled with chemical contents name and exposure risks.

13. It is the responsibility of every employee to immediately identify and report to the supervisor any unsafe act or prohibited practice.

Safety is everyone responsibility at the workplace. Any violation to Safety and Health Rules are subject to disciplinary action by CORCO Management.

5.0 RESPONSIBILITIES

The provisions of this plan are mandatory for all on-site CORCO and subcontractor employees who are engaged in construction and maintenance activities which involve disturbance of soils and/or subsoil's and excavations within CORCO's Main Site, Oxochem and Caribe Isoprene facilities ("affected activities"). This plan has been developed under United States Environmental Protection Agency (EPA) guidelines and complies with applicable regulations, including Occupational Safety and Health Administration (OSHA) standards (29 Code of Federal Regulations [CFR] 1910 and 1926).

For any project requiring a subcontractor, each subcontractor will prepare and work under its own Health and Safety Plan, a plan that at a minimum meets the requirements of this document. Subcontractor personnel will perform in the role of SM and Site Safety Officer (SSO).

CORCO employees and CORCO subcontractors will be fully responsible for the safe performance of work by each of their employees, and subcontractor or support personnel who may enter each affected site. All subcontractor work will be performed in accordance with the individual subcontractor's HSPs, which will comply with, at a minimum, the requirements of this plan.

All onsite personnel will strictly adhere to the provisions of this Health and Safety Plan along with the applicable regulations issued by governmental entities.

5.1 PROJECT MANAGER (PM)

CORCO's PM, Roberto Gratacós, will oversee overall field operations, and may delegate all or part of these duties on an as needed basis to a properly qualified CORCO employee who is designated as the PC. CORCO's PM has ultimate responsibility for proper implementation of the sampling program, and of overall field direction, to include the following responsibilities for all onsite personnel:

1. Assuring that appropriate personal protective equipment and monitoring equipment are available and properly utilized;

2. Establishing that on-site personnel are aware of the provisions of their H&S Plan, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies;

3. Establishing that the nature and scope of work do not require on-site personnel to have completed a minimum of 40 hours of health and safety training and have appropriate medical clearance as required by 29 CFR 1910.120. In the event the project requires additional health and safety training, the PM or his/her designee will develop a project specific health and safety plan.

4. Assuring that on-site personnel are aware of the potential hazards associated with Site operations;

5. Monitoring the safety performance of on-site personnel to see that the required work practices are employed;

6. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances;

7. Preparing any accident/incident reports for on-site activities;

8. Completing Plan Acceptance forms;

9. Halting on-site operations, if necessary, in the event of an emergency or to correct unsafe work practices; and

10. Reviewing and approving the project Health & Safety Plan.

5.2 PROJECT COORDINATOR (PC)

The PC, when delegated by the PM, will oversee day-to-day Site operations including responsibilities listed above for the PM, and may delegate those duties related to the safety and health of onsite personnel to a properly qualified CORCO employee or subcontractor who is designated as the SSO. For this project, the PC will be an employee of CORCO. The PC and the SSO, have primary responsibility for overall field operations. For this project, the PC will also have the following responsibilities for CORCO and subcontractor personnel:

1. Assuring that appropriate personal protective equipment and monitoring equipment are available and properly utilized;

2. Establishing that on-site personnel are aware of the provisions of their HSP, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies;

3. Assuring that on-site personnel are aware of the potential hazards associated with Site operations;

4. Monitoring the safety performance of on-site personnel to see that the required work practices are employed;

5. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances;

6. Preparing any accident/incident reports for on-site activities;

7. Completing Plan Acceptance forms;

8. Halting on-site operations, if necessary, in the event of an emergency or to correct unsafe work practices; and

9. Reviewing and approving the project Health & Safety Plan.

5.3 SITE SAFETY OFFICER (SSO)

The SSO duties may be carried out by the designated SSO or, in his/her absence, by the PC. The SSO will oversee the proper implementation of this HSP for all on-site personnel or any subcontractor unless there is an imminent endangerment to subcontractor personnel, in which case guidance will be directed to the Subcontractor Safety Representative (SSR) only. The SSO will also perform the following for all CORCO and subcontractor personnel subject to this HSP:

1. Implement project HSPs and report any deviations from the anticipated conditions described in the plan to the PC and the PM.

2. Determine that monitoring equipment is used properly and is calibrated in accordance with manufacturer's instructions or other standards, and that results are properly recorded

and filed (a Daily Instrument Calibration Check Sheet is provided in Appendix A to the AMP);

3. Check with CORCO's PM and PC to see that on-site personnel have current fit-for-duty medical and training authorizations as pertinent;

4. Assume any other duties as directed by the PM or PC;

5. Identify all on-site personnel with special medical problems (e.g., allergies, perforated eardrum, etc.);

6. Conduct/verify conducting of regular safety meetings and completes the Site Safety Briefing Report (see Appendix A);

7. Provide ongoing review of the protection level needs as project work is performed, and inform the PC or PM of the need to upgrade/downgrade protection levels as appropriate;

8. Ensure that on-site personnel follow decontamination procedures listed in Section 9.0;

9. Establish monitoring of CORCO personnel and record results of exposure evaluations;

10. Halt Site operations, if necessary, in the event of an emergency or to correct unsafe work practices;

11. Review and recommend acceptance by CORCO of each subcontractors' project Health and Safety Plans; and

12. Ensure that copies of contact members, directions to the hospital location plan are maintained at the CP for the project site.

5.4 PROJECT PERSONNEL

All personnel involved in activities covered by the HSP are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees;

2. Performing only those tasks that they believe they can do safely, immediately reporting any accidents and/or unsafe conditions to the SSO or PC;

3. Implementing the procedures set forth in the HSP, and reporting any deviations from the procedures described in the Plan to the SSO or PC for action;

4. Notifying the PC and SSO of any special medical problems (i.e., allergies) and seeing that all on-site personnel are aware of any such problems; and

5. Reviewing the project HSP and signing the acceptance form.

5.5 SUBCONTRACTOR'S SAFETY REPRESENTATIVE (SSR)

Each subcontractor to CORCO will be required to designate a Subcontractor's Safety Representative (SSR), who is the subcontractor supervisor. The SSR is responsible for the safe performance of work by his work force and subcontractors. During the subcontractor's activities on-site, the SSR will perform work area inspections, conduct safety meetings, and conduct safety orientations for all new employees. The SSR will attend periodic safety meetings with the SSO. The SSR will also investigate accidents and overexposures involving subcontractor personnel.

5.6 SUBCONTRACTOR PERSONNEL

All subcontractor personnel will follow the following Health & Safety requirements:

Subcontractor employees will have training considered appropriate for the specific activity.

1. Subcontractors will provide proof of both any pertinent training and a physical before Site work may begin;

2. Personnel will have appropriate personal protective equipment (PPE) for the specific job. At a minimum, personnel should have the following equipment, which will be inspected by the SM and SSO:

    - Hard hat
    - Safety shoes
    - Gloves
    - Goggles/safety glasses
    - Hearing protection, if appropriate
    - Respiratory protection, if appropriate (with fit test)
    - Other equipment as specified by the HSP; and

3. Drilling equipment and field operations will meet applicable safety standards and satisfy the SSO's field inspection. Unsafe equipment or operations will necessitate shut down of the job at the cost of the subcontractor.

Before field activities begin, each subcontractor will develop its own HSP that will be reviewed by SSO and PC prior to the beginning of subcontractor work. This HSP may be used as a guide for the minimum requirements of Health & Safety at the Site, but is not a substitute for an independent HSP prepared by the subcontractor. Each subcontractor's HSP must, at a minimum, comply with the requirements of this plan.

Under any circumstance, all subcontractors are fully and completely responsible for the health and safety of their Site workers while executing work at the CORCO Site. Each subcontractor is required to sign the Subcontractor Statement of Compliance (see Appendix B of this Plan) for all on-site employees before any Site work begins. Also, all subcontractors are required to agree that they will take any additional measures deemed necessary to meet at least minimum applicable health and safety standards if unforeseen circumstances arise.

Subcontractors will provide at least minimum safety equipment as required by the HSP. When respirators are necessary, subcontractors will provide a respirator fit test certificate and a physician's "fit for respirator use" declaration.

6.0 JOB HAZARD ANALYSIS

As previously outlined, soils and subsoil's subject to this HSP may have been impacted by petroleum products typically managed in a refinery and petrochemical process facility, including residual crude oil, diesel, leaded and unleaded gasoline, #6 and #2 fuel oils, and others hydrocarbon compounds. Contaminants of concern (COCs) from these fuels include carcinogenic polycyclic aromatic hydrocarbons (PAHs), select VOCs associated with fuels, and lead. The following COCs have been selected for the Job Hazard Analysis in this section:

Carcinogenic PAHs	Volatile Organic Compounds (VOCs)
Benzo(a)anthracene	Benzene
Benzo(a)pyrene	Toluene
Benzo(b)fluoranthene	Ethylbenzene
Benzo(k)fluoranthene	Xylenes
Chrysene	Metals
Dibenzo(a,h)anthracene	Arsenic
Indeno(1,2,3-cd)pyrene	Lead

While the exposures anticipated from these materials during field activities are expected to be minimal, and not all of the above contaminants are expected to be encountered in media at the Site, the provisions of this plan are directed toward ensuring that all potential exposures are minimized during Site activities covered by this HSP. Field sampling personnel will wear National Institute for Occupational Safety and Health (NIOSH) approved air-purifying respirators with combination High Efficiency Particulate Air Filter (HEPA) and organic vapor filters whenever and as warranted by Site conditions and sampling procedures. Additionally, if work activities pose the potential to generate airborne dusts, field-sampling personnel will wear

NIOSH-approved air-purifying respirators with HEPA filters or combination organic vapor/HEPA filters as warranted by Site conditions.

Physical hazards at this work site include those associated with:

- Heat stress;
- Slip-trip-fall type of accidents;
- Back injuries due to improper lifting;
- Being caught in or struck by moving equipment; and
- Electrocution or explosion hazards associated with drilling or excavation activities, such as contact with overhead power lines or underground pipelines.
- Hazards associated to work in confined spaces

6.1 CHEMICAL HAZARDS

From an occupational health standpoint, given that any potential exposure to Site personnel will be only for a short period of time (intermittent exposure during course of field activities), the levels of contaminants expected at the Site should not represent a significant concern. However, the potential for exposure to elevated levels of these contaminants may exist. Overviews of the hazards associated with exposure to the chemicals expected at the Site are presented below in terms of the following types of occupational exposure limits:

IDLH – Immediately Dangerous to Life and Health
PEL – Permissible Exposure Limit
C – Ceiling
TLV – Threshold Limit Value
TLV-STEL – Short Term Exposure Limit
REL – Recommended Exposure Limit

The NIOSH recommended exposure limits (RELs) are time-weighted average (TWA) concentrations for up to a 10-hour workday during a 40-hour workweek. A short-term exposure limit (STEL) is designated by "ST" preceding the value; unless noted otherwise; the STEL is a 15-minute TWA exposure that should not be exceeded at any time during a workday. A ceiling REL is designated by "C" preceding the value. The notation “Ca” designates any substance that NIOSH considers to be a potential occupational carcinogen.

The OSHA permissible exposure limits (PELs) are found in Tables Z-1, Z-2, and Z-3 of the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000). Unless noted otherwise, PELs are TWA concentrations are those that must not be exceeded during any 8-hour

work shift of a 40-hour workweek. An STEL is designated by "ST" preceding the value and is measured over a 15-minute period unless noted otherwise. OSHA ceiling concentrations (designated by "C" preceding the value) must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure. In addition, there are a number of substances from Table Z-2 (e.g., beryllium, ethylene dibromide, etc.) that have PEL ceiling values that must not be exceeded except for specified exclusions. For example, a "5-minute maximum peak in any 2 hours" means that a 5-minute exposure above the ceiling value, but never above the maximum peak, is allowed in any 2 hours during an 8-hour workday.

Benzene

Exposure Values:

- IDLH: **"Ca"** 500 ppm
- TLV TWA: 0.5 ppm
- NIOSH REL: **"Ca"** TWA 0.1 ppm; ST 1 ppm
- OSHA PEL: TWA 1 ppm; ST 5 ppm

Description:

Benzene, also known as benzol, is a clear colorless to light yellow liquid with a sweet aromatic odor. It evaporates quickly in air and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities. Benzene vapor is heavier than air and may travel along the ground; distant ignition is possible. As a result of flow, agitation, etc., electrostatic charges can be generated causing combustion.

Benzene is widely used; it ranks in the top 20 chemicals for production volume in the United States. Some industries use benzene to make other chemicals that are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Benzene is a natural component of crude oil, gasoline and other refined fuels, and cigarette smoke.

Chemical Properties:

Benzene can pass into air from water and soil surfaces. Once in the air, benzene reacts with other chemicals and breaks down within a few days. Benzene in the air can attach to rain or snow and be carried back down to the ground. Benzene in water and soil breaks down more slowly. Benzene is slightly soluble in water and can pass through soil into underground water. It is also soluble in many organic solvents, including alcohol, chloroform, ether, carbon disulfide, acetone, oils, carbon tetrachloride, and glacial acetic acid. Benzene attacks plastic and rubber. Benzene reacts violently with oxidants, nitric acid, sulfuric acid, and halogens causing fire and explosion hazard. The Lower Explosive Limit (LEL) and Upper Explosive Limit (UEL) of benzene is 1.3 percent and 7.9 percent by volume in air, respectively. Benzene in the environment does not build up in plants or animals.

Identification:

- Chemical Name: benzene
- Regulatory Name: benzene
- Formula: C_6H_6
- DOT Label: 1114
- CAS: 71-43-2
- CHRIS: BNZ
- UN Number: 1114

Health Effects:

Benzene can be absorbed into the body by inhalation, ingestion, and dermal absorption. The type and severity of health effects from benzene exposure depend on the amount of benzene to which you are exposed and the length of time of the exposure. Brief exposure (5-10 minutes) to very high levels of benzene in the air (10,000 to 20,000 ppm) can result in death. Lower levels (700 to 3,000 ppm) can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. In most cases, people will stop feeling these effects when they stop being exposed and begin breathing fresh air.

Eating foods or drinking liquids containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, coma, and death. If you spill benzene on your skin, it may cause redness and sores. Benzene in your eyes may cause general irritation and damage to your cornea.

Benzene causes problems in the blood. People who breathe benzene for long periods may experience harmful effects in the tissues that form blood cells, especially the bone marrow. These effects can disrupt normal blood production and cause a decrease in important blood components. A decrease in red blood cells can lead to anemia. Reduction in other components in the blood can cause excessive bleeding.

EPA, the U.S. Department of Health and Human Services (DHHS), and the International Agency for Cancer Research (IARC) have determined that benzene is a human carcinogen. Long-term exposure to benzene in air can cause cancer of the blood-forming organs (leukemia). Exposure to benzene may also be harmful to the reproductive organs. It is not known what effects exposure to benzene might have on the developing fetus in pregnant women or on fertility in men; however, studies with pregnant animals show inhalation effects include low birth weight, delayed bone formation, and bone marrow damage.

Regulations:

The EPA has set the maximum permissible level of benzene in drinking water at 0.005 ppm, and a goal of 0 parts per million for benzene in drinking water and in waters such as rivers and lakes. EPA recommends a maximum permissible level of benzene in water of 0.2 ppm for short-term exposures (10 days) for children.

OSHA requires employers of workers who are occupationally exposed to benzene to institute engineering controls and work practices to reduce and maintain employee exposure at or below permissible exposure limits (PEL). If the employer can document that benzene is used in the workplace less than 30 days per year, the employer can use any combination of engineering controls, work practice controls, or respirators to reduce employee exposure to or below the

(PEL) of 1 ppm. However, the employer must use engineering and work practice controls, if feasible, to reduce exposure to or below an 8-hour TWA of 10 ppm. Respirators must be provided and used during the time period necessary to install or implement feasible engineering and work practice controls, or where controls are not yet sufficient. Respirators are also required when the employer determines that compliance with the TWA or PEL is not feasible with engineering or work practice controls, such as maintenance and repair activities, vessel cleaning, or other operations where exposures are intermittent and limited in duration, and in emergencies (OSHA 1987b).

Ethylbenzene

Exposure Values:

- IDLH: 800 ppm
- TLV TWA: 100 ppm; TWA C 125 ppm
- NIOSH REL: TWA 100 ppm (435 mg/m^3); ST 125 ppm (545 mg/m^3)
- OSHA PEL: TWA 100 ppm

Description:

Ethylbenzene is an aromatic hydrocarbon that occurs naturally in petroleum and is a component of aviation and automotive fuels. It is used as a solvent and in the production of synthetic rubber and styrene.

Ethylbenzene is a colorless liquid that smells like gasoline. You can smell ethylbenzene in the air at concentrations as low as 2 parts of ethylbenzene per million parts of air by volume (ppm). It evaporates at room temperature and burns easily. Ethylbenzene occurs naturally in coal tar and petroleum. It is also found in many products, including paints, inks, and insecticides. Gasoline contains about 2% (by weight) ethylbenzene. Ethylbenzene is used primarily in the production of styrene. It is also used as a solvent, a component of asphalt and naphtha, and in fuels. In the chemical industry, it is used in the manufacture of acetophenone, cellulose acetate, diethylbenzene, ethyl anthraquinone, ethylbenzene sulfonic acids, propylene oxide, and α-methylbenzyl alcohol. Consumer products containing ethylbenzene include pesticides, carpet glues, varnishes and paints, and tobacco products.

Ethylbenzene is most commonly found as a vapor in the air. This is because ethylbenzene moves easily into the air from water and soil. Once in the air, other chemicals help break down ethylbenzene into chemicals found in smog. This breakdown happens in less than 3 days with the aid of sunlight. In surface water such as rivers and harbors, ethylbenzene breaks down by reacting with other compounds naturally present in the water. In soil, the majority of ethylbenzene is broken down by soil bacteria. Since ethylbenzene binds only moderately to soil, it can also move downward through soil to contaminate groundwater.

Some people are exposed to ethylbenzene in the workplace. Gas and oil workers may be exposed to ethylbenzene either through skin contact or by breathing ethylbenzene vapors. Varnish workers, spray painters, and people involved in gluing operations may also be exposed to high levels of ethylbenzene. Exposure may also occur in factories that use ethylbenzene to produce other chemicals.

You may be exposed to ethylbenzene if you live near hazardous waste sites containing ethylbenzene or areas where ethylbenzene spills have occurred. Higher-than-background levels of ethylbenzene were detected in groundwater near a landfill and near an area where a fuel spill had occurred. No specific information on human exposure to ethylbenzene near hazardous waste sites is available.

You may also be exposed to ethylbenzene from the use of many consumer products. Gasoline is a common source of ethylbenzene exposure. Other sources of ethylbenzene exposure come from the use of this chemical as a solvent in pesticides, carpet glues, varnishes and paints, and from the use of tobacco products.

When you breathe air containing ethylbenzene vapor, it enters your body rapidly and almost completely through your lungs. Ethylbenzene in food or water can also rapidly and almost completely enter your body through the digestive tract. It may enter through your skin when you come into contact with liquids containing ethylbenzene. Ethylbenzene vapors do not enter through your skin to any large degree. People living in urban areas or in areas near hazardous waste sites may be exposed by breathing air or by drinking water contaminated with ethylbenzene.

Once in your body, ethylbenzene is broken down into other chemicals. Most of it leaves in the urine within 2 days. Small amounts can also leave through the lungs and in feces. Liquid ethylbenzene that enters through your skin is also broken down. Ethylbenzene in high levels is broken down slower in your body than low levels of ethylbenzene. Similarly, ethylbenzene mixed with other solvents is also broken down more slowly than ethylbenzene alone. This slower breakdown will increase the time it takes for ethylbenzene to leave your body.

Chemical Properties:

Ethylbenzene is a flammable and combustible liquid. The LEL and UEL of ethylbenzene is 1.0 percent and 6.7 percent by volume in air, respectively. Vapors are heavier than air and may travel to a source of ignition and flash back. Liquid ethylbenzene floats on water and may travel to a source of ignition and spread fire. Combustion may produce irritants and toxic gases (NFPA 1994). Ethylbenzene may accumulate static electricity and will react with oxidizing materials (NFPA 1994).

Identification:

- Chemical Name: ethylbenzene
- Regulatory Name: ethylbenzene

- Formula: C_8H_{10}
- DOT Label: 1175
- CAS: 100-41-4
- CHRIS: ETB
- UN Number: 1175

Health Effects:

At certain levels, exposure to ethylbenzene can harm your health. People exposed to high levels of ethylbenzene in the air for short periods have complained of eye and throat irritation. Persons exposed to higher levels have shown signs of more severe effects such as decreased movement and dizziness. No studies have reported death in humans following exposure to ethylbenzene alone. However, evidence from animal studies suggests that it can cause death at very high concentrations in the air (about 2 million times the usual level in urban air). Whether or not long-term exposure to ethylbenzene affects human health is not known because little information is available. Short-term exposure of laboratory animals to high concentrations of ethylbenzene in air may cause liver and kidney damage, nervous system changes, and blood changes. The link between these health effects and exposure to ethylbenzene is not clear because of conflicting results and weaknesses in many of the studies. Also, there is no clear evidence that the ability to get pregnant is affected by breathing air or drinking water containing ethylbenzene, or coming into direct contact with ethylbenzene through the skin. Two long-term studies in animals suggest that ethylbenzene may cause tumors. One study had many weaknesses, and no conclusions could be drawn about possible cancer effects in humans. The other, a recently completed study, was more convincing, and provided clear evidence that ethylbenzene causes cancer in one species after exposure in the air to concentrations greater than 740 ppm that were approximately 1 million times the levels found in urban air. At present, the federal government has not identified ethylbenzene as a chemical that may cause cancer in humans. However, this may change after consideration of the new data.

There are no reliable data on the effects in humans after eating or drinking ethylbenzene or following direct exposure to the skin. For this reason, levels of exposure that may affect your health after eating, drinking, or getting ethylbenzene on your skin are estimated from animal studies. There are only two reports of eye or skin exposure to ethylbenzene. In these studies, liquid ethylbenzene caused eye damage and skin irritation in rabbits. More animal studies are available that describe the effects of breathing air or drinking water containing ethylbenzene.

Regulation:

EPA's Office of Drinking Water (ODW) set 700 ppb (this equals 0.7 milligrams ethylbenzene per liter of water or mg/L) as the acceptable exposure concentration of ethylbenzene in drinking water for an average weight adult. This value is for lifetime exposure and is set at a level that is expected not to increase the chance of having (non-cancer) adverse health effects. The same EPA office (ODW) set higher acceptable levels of ethylbenzene in water for shorter periods (20 ppm or 20 mg/L for 1 day, 3 ppm or 3 mg/L for 10 days). EPA has determined that exposures at or below these levels are acceptable for small children. If you eat fish and drink water from a body of water, the water should contain no more than 1.4 mg ethylbenzene per liter.

OSHA set a legal limit of 100 ppm ethylbenzene in air. This is for exposure at work for 8 hours per day. NIOSH also recommends an exposure limit for ethylbenzene of 100 ppm. This is for exposure to ethylbenzene in air at work for up to 10 hours per day in a 40-hour workweek. NIOSH also set a limit of 125 ppm for a 15minute period.

Polycyclic Aromatic Hydrocarbons

Exposure Values:

- IDLH: **"Ca"** 80 mg/m^3
- TVL TWA: 0.2 mg/m^3 (ACGIH 1993)
- NIOSH REL: **"Ca"** TWA 0.1 mg/m^3
- OSHA PEL TWA: 0.2 mg/m^3 (Coal tar pitch volatiles-benzene soluble fraction)(OSHA 1993; ACGIH 1991)

Description:

PAHs are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. There are more than 100 different PAHs. PAHs generally occur as complex mixtures (for example, as part of combustion products such as soot), not as single compounds. PAHs usually occur naturally, but they can be manufactured as individual compounds for research purposes; however, not as the mixtures found in combustion products. As pure chemicals, PAHs generally exist as colorless, white, or pale yellow-green solids. They can have a faint, pleasant odor. A few PAHs are used in medicines and to make dyes, plastics, and pesticides. Others are contained in asphalt used in road construction. They can also be found in substances such as crude oil, coal, coal tar pitch, creosote, and roofing tar. They are found throughout the environment in the air, water, and soil. They can occur in the air, either attached to dust particles or as solids in soil or sediment.

Although the health effects of individual PAHs are not exactly alike, the following carcinogenic PAHs are considered as a group in this HSP: benzo(a)anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

acenaphthene	benzo(b)fluoranthene	fluoranthene
acenaphthylene	benzo(g,h,i)perylene	fluorene
anthracene	benzo(j)fluoranthene	indeno(1,2,3-cd)pyrene
benzo[a]anthracene	benzo(k)fluoranthene	phenanthrene
benzo[a]pyrene	chrysene	pyrene
benzo[e]pyrene	dibenz(a,h)anthracene	

These carcinogenic PAHs were chosen to be included in this profile because (1) more information is available on these than on the others; (2) they are suspected to be more harmful than some of the others, and they exhibit harmful effects that are representative of the PAHs; (3) there is a greater chance of exposure to these PAHs than to the others; and (4) of all the PAHs analyzed, these were the PAHs identified at the highest concentrations at NPL hazardous waste sites.

Released PAHs are largely associated with particulate matter, soils, and sediments. Although environmental concentrations are highest near sources, its presence in places distant from primary sources indicates that it is reasonably stable in the atmosphere and capable of long distance transport.

When released to air it may be subject to direct photolysis, although adsorption to particulates apparently can retard this process. If released to water, it will be expected to adsorb very strongly to sediments and particulate matter. It will not hydrolyze. It has been shown to be susceptible to significant metabolism by microorganisms in some natural waters without use as carbon or energy source, but in most waters and in sediments it is stable towards biodegradation.

If released to soil it will be expected to adsorb very strongly and will not be expected to leach to the groundwater. However, its presence in some groundwater samples indicates that it can be transported there by some mechanism. It will not hydrolyze, and evaporation from soils and surfaces is not expected to be significant. Human exposure will be from inhalation of contaminated air and consumption of contaminated food and water. Especially high exposure will occur through the smoking of cigarettes and the ingestion of certain foods (e.g. smoked and charcoal broiled meats and fish).

Chemical Properties:

The PAHs listed occur as needles, plates, crystals, leaflets, or prisms ranging from colorless to pale yellow to golden yellow. Four of the PAHs, benzo[a]anthracene, dibenzo[a,i]pyrene, indeno[1,2,3-cd]pyrene, and 5-methylchrysene, show fluorescence ranging from greenish yellow to brilliant bluish violet to brown. Solubility characteristics vary for each PAH, but in general they are slightly soluble to insoluble in ethanol, and are soluble to slightly soluble in acetic acid, benzene, and acetone. Several PAHs are soluble in toluene, xylene, 1,4-dioxane, and other organic solvents. Some of the PAHs are soluble in mineral and/or olive oil, and dibenz[a,h]anthracene is soluble in cyclohexane. PAHs are insoluble in diethyl ether and petroleum ether, and most are insoluble in water. When heated to decomposition, benzo[a]pyrene emits acrid smoke, and benzo[j]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and 5-methylchrysene emit acrid smoke and irritating fumes. Dibenz[a,h]acridine, dibenz[a,j]acridine, and 7H-dibenzo[c,g]carbazole emit toxic nitrogen oxide (NO_x) fumes when heated to decomposition.

Chemical Name	Regulatory Name	Formula	DOT Label	CAS Number	CHRIS	UN Number

benzo[a]anthracene	benzo[a]anthracene	$C_{18}H_{12}$	NA	56-55-3	NA	NA
benzo[a]pyrene	benzo[a]pyrene	$C_{20}H_{12}$	NA	50-32-8	NA	NA
benzo[b]fluoranthene	benzo[b]fluoranthene	$C_{20}H_{12}$	NA	205-99-2	NA	NA
benzo[k]fluoranthene	benzo[k]fluoranthene	$C_{20}H_{12}$	NA	207-08-9	NA	NA
Chrysene	chrysene	$C_{18}H_{12}$	NA	218-01-9	NA	NA
dibenz(a,h)anthracene	dibenz(a,h)anthracene	$C_{22}H_{14}$	NA	53-70-3	NA	NA
indeno(1,2,3-cd)pyrene	indeno(1,2,3-cd)pyrene	$C_{22}H_{12}$	NA	193-39-5	NA	NA

Health Effects:

PAHs can enter the body through the lungs when one breathes air that contains PAHs (usually stuck to particles or dust). Cigarette smoke, wood smoke, coal smoke, and smoke from many industrial sites may contain PAHs. People living near hazardous waste sites can also be exposed by breathing air-containing PAHs. However, it is not known how rapidly or completely the lungs absorb PAHs. Drinking water and swallowing food, soil, or dust particles that contain PAHs are other routes for these chemicals to enter the body, but absorption is generally slow when PAHs are swallowed. Under normal conditions of environmental exposure, PAHs could enter the body through dermal contact with soil that contains high levels of PAHs (this could occur near a hazardous waste site) or with used crankcase oil or other products (such as creosote) that contain PAHs. The rate at which PAHs enter the body by eating, drinking, or through the skin can be influenced by exposure to other compounds at the same time with PAHs. PAHs can enter the body tissues that contain fat. They tend to be stored mostly in the kidneys, liver, and fat. Smaller amounts are stored in the spleen, adrenal glands, and ovaries. PAHs are changed by all tissues in the body into many different substances. Some of these substances are more harmful and some are less harmful than the original PAHs. Results from animal studies show that PAHs do not tend to be stored in the body for a long time. Most PAHs that enter the body leave within a few days, primarily in the feces and urine.

PAHs can be harmful to human health under some circumstances. Several of the PAHs, including benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene, have caused tumors in laboratory animals when they breathed these substances in the air, when they ate them, or when they had long periods of dermal contact with them. Studies of people show that individuals exposed by breathing or skin contact for long periods to mixtures that contain PAHs and other compounds can also develop cancer.

Mice fed high levels of **PAHs** during pregnancy had difficulty reproducing and so did their offspring. The offspring of pregnant mice fed PAHs also showed other harmful effects, such as birth defects and decreased body weight. Similar effects could occur in people, but we have no information to show that these effects do occur.

Studies in animals have also shown that PAHs can cause harmful effects on skin, body fluids, and the body's system for fighting disease after both short- and long-term exposure. These effects have not been reported in people.

The DHHS has determined that benzo[a]anthracene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene**,** benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene are known animal carcinogens. The IARC has determined the following: benzo[a]anthracene and benzo[a]pyrene are probably carcinogenic to humans; benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, and indeno[1,2,3-c,d]pyrene are possibly carcinogenic to humans; and anthracene, benzo[g,h,i]perylene, benzo[e]pyrene, chrysene, fluoranthene, fluorene, phenanthrene, and pyrene are not classifiable as to their carcinogenicity to humans. EPA has determined that benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene are probable human carcinogens and that acenaphthylene, anthracene, benzo[g,h,i]perylene, fluoranthene, fluorene, phenanthrene, and pyrene are not classifiable as to human carcinogenicity.

Regulation:

The Carcinogen Assessment Group at EPA has designated most of the PAHs as potential carcinogens. As a result, EPA regulates the PAHs under the hazardous waste disposal rule of the RCRA. CERCLA has established RQs for most of the PAHs. Water quality criteria set by the CWA also address all PAHs. EPA has included some PAHs on a list of priority hazardous chemicals subject to reporting requirements under the SARA. There have been few attempts to develop occupational exposure standards for specific PAHs. However, for coal tar products, NIOSH recommended a workplace standard of 0.1 mg/m^3 as a 10-hr TWA. OSHA indirectly limits exposure to PAHs by requiring that occupational exposure to coal tar pitch volatiles not exceed 0.2 mg/m^3 as an 8-hr TWA. In another attempt to minimize the risk of workplace exposure to PAHs, OSHA promulgated a PEL of $\leq$ 0.15 mg/m^3 as an 8- hr TWA for coke oven emissions. OSHA also regulates PAHs under the Hazard Communication Standard and as chemical hazards in laboratories.

Lead

Exposure Values:

- IDLH: 100 mg/m^3 (as Pb)
- TLV TWA: 0.15 mg/m^3 (ACGIH 1993)
- NIOSH REL: TWA 0.050 mg/m^3
- OSHA PEL: TWA 0.050 mg/m^3

Description:

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. It has no characteristic taste or smell. Metallic lead does not dissolve in water and does not burn. Lead

can combine with other chemicals to form what are usually known as lead compounds or lead salts. Some lead salts dissolve in water better than others. Some natural and manufactured substances contain lead but do not look like lead in its metallic form. Some of these substances can burn - for example, organic lead compounds in some gasolines.

Lead has many different uses. Its most important use is in the production of some types of batteries. It is also used in the production of ammunition, in some kinds of metal products (such as sheet lead, solder, some brass and bronze products, and pipes) and in ceramic glazes. Some chemicals containing lead, such as tetraethyl lead and tetramethyl lead, were once used as gasoline additives to increase octane rating. However, their use was phased out in the 1980s, and lead was banned for use in gasoline for transportation beginning January 1, 1996. Other chemicals containing lead are used in paint. The amount of lead added to paints and ceramic products, caulking, gasoline, and solder has also been reduced in recent years to minimize lead's harmful effects on people and animals. Lead used in ammunition, which is the largest non-battery end-use, has remained fairly constant in recent years. Lead is used in a large variety of medical equipment (radiation shields for protection against X-rays, electronic ceramic parts of ultrasound machines, intravenous pumps, fetal monitors, and surgical equipment). Lead is also used in scientific equipment (circuit boards for computers and other electronic circuitry) and military equipment (jet turbine engine blades, military tracking systems).

Most lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). Human activities (such as use of "leaded" gasoline) have spread lead and substances that contain lead to all parts of the environment. For example, lead is in air, drinking water, rivers, lakes, oceans, dust, and soil. Lead is also in plants and animals that people may eat.

Most of the lead in inner city soils comes from old houses painted with paint containing lead and previous automotive exhaust emitted when gasoline contained lead. Landfills may contain waste from lead ore mining, ammunition manufacturing, or other industrial activities such as battery production.

Sources of lead in dust and soil include lead that falls to the ground from the air, and weathering and chipping of lead-based paint from buildings and other structures. Lead in dust may also come from windblown soil. Disposal of lead in municipal and hazardous waste dump sites may also add lead to soil. Mining wastes that have been used for sandlots, driveways, and roadbeds can be also sources of lead.

Chemical properties:

Lead readily tarnishes in the atmosphere but is one of the most stable fabricated metals because of its corrosive resistance to air, water, and soil (Howe 1981). Lead is insoluble in water but soluble in nitric acid and hot sulfuric acid. Lead has no characteristic odor.

Identification:

- Chemical Name: Lead

- Regulatory Name: Lead
- Formula: Pb
- DOT Label: N/A
- CAS: 7439-92-1
- CHRIS: N/A
- UN Number: N/A

Health effects:

People living near hazardous waste sites may be exposed to lead and chemicals that contain lead by breathing air, drinking water, eating foods, or swallowing or touching dust or dirt that contains lead. For people who do not live near hazardous waste sites, exposure to lead may occur in several ways: (1) by eating foods or drinking water that contain lead, (2) by spending time in areas where leaded paints have been used and are deteriorating, (3) by working in jobs where lead is used, (4) by using health-care products or folk remedies that contain lead, and (5) by having hobbies in which lead may be used such as sculpturing (lead solder) and staining glass.

The effects of lead are the same whether it enters the body through breathing or swallowing. The main target for lead toxicity is the nervous system, both in adults and in children. Long-term exposure of adults to lead at work has resulted in decreased performance in some tests that measure functions of the nervous system. Lead exposure may also cause weakness in fingers, wrists, or ankles. Some studies in humans have suggested that lead exposure may increase blood pressure, but the evidence is inconclusive. Lead exposure may also cause anemia, a low number of blood cells. The connection between the occurrence of some of these effects (e.g., increased blood pressure, altered function of the nervous system) and low levels of exposure to lead is not certain. At high levels of exposure, lead can severely damage the brain and kidneys in adults or children. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

There is no proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice given large doses of lead. The animal studies have been criticized because of the very high doses used, among other things. The results of high-dose studies should not be used to predict whether lead may cause cancer in humans. The DHHS has determined that lead acetate and lead phosphate may reasonably be expected to be capable of causing cancer, based on sufficient evidence from animal studies, but there is inadequate evidence from human studies.

Regulation:

The federal government develops regulations and recommendations to protect public health. Regulations can be enforced by law. Federal agencies that develop regulations for toxic substances include the EPA, OSHA, and the FDA. Recommendations provide valuable guidelines to protect public health but cannot be enforced by law. Federal organizations that

develop recommendations for toxic substances include the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH).

Regulations and recommendations can be expressed in not-to-exceed levels in air, water, soil, or foods that are usually based on levels that affect animals; then they are adjusted to help protect people. Sometimes these not-to-exceed levels differ among federal organizations because of different exposure times (an 8-hour workday or a 24-hour day), the use of different animal studies, or other factors.

EPA requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter (mg/m^3) averaged over 3 months. EPA regulations no longer allow lead in gasoline. The Clean Air Act Amendments (CAAA) of 1990 banned the sale of leaded gasoline as of December 31, 1995.

EPA regulations also limit lead in drinking water to 0.015 milligrams per liter (mg/L). The 1988 Lead Contamination Control Act requires the Consumer Product Safety Commission (CPSC), EPA, and the states to recall or repair water coolers containing lead. This law also requires new coolers to be lead-free. In addition, drinking water in schools must be tested for lead, and the sources of lead in this water must be removed.

OSHA regulations limit the concentration of lead in workroom air to 50 $\mu g/m^3$ for an 8-hour workday. If a worker has a blood lead level of 50 µg/dL, then OSHA requires that worker be removed from the workroom where lead exposure is occurring.

NIOSH considers "Lead" to mean metallic lead, lead oxides, and lead salts (including organic salts such as lead soaps but excluding lead arsenate).

The NIOSH REL for lead (8-hour TWA) is 0.050 mg/m^3; air concentrations should be maintained so that worker blood lead remains less than 0.060 mg Pb/100 g of whole blood.

OSHA considers "Lead" to mean metallic lead, all inorganic lead compounds (lead oxides and lead salts), and a class of organic compounds called soaps; all other lead compounds are excluded from this definition.

The OSHA PEL (8-hour TWA) is 0.050 mg/m^3; other OSHA requirements can be found in 29 CFR 1910.1025. The OSHA PEL (8-hour TWA) for lead in "non-ferrous foundries with less than 20 employees" is 0.075 mg/m^3.

Toluene

Exposure Values:

- IDLH: 500 ppm
- TLV TWA: 50 ppm

- NIOSH REL: TWA 100 ppm (375 mg/m^3); ST 150 ppm (560 mg/m^3)
- OSHA PEL: TWA 200 ppm , C 300 ppm, 500 ppm (10-minute maximum peak)

Description:

Toluene is a clear, colorless liquid with a distinctive smell. It is a good solvent (a substance that can dissolve other substances). It is added to gasoline along with benzene and xylene. Toluene occurs naturally in crude oil and in the tolu tree. It is produced in the process of making gasoline and other fuels from crude oil, in making coke from coal, and as a by-product in the manufacture of styrene. Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes. It is disposed of at hazardous waste sites as used solvent or at landfills where it is present in discarded paints, paint thinners, and fingernail polish. You can begin to smell toluene in the air at a concentration of 8 parts of toluene per million parts of air (ppm), and taste it in your water at a concentration of between 0.04 and 1 ppm.

Chemical Properties:

Toluene is a colorless liquid with a sweet benzene-like odor. It is soluble in water and miscible in organic solvents. Toluene vapor may explode if ignited in a closed area. The LEL and UEL of toluene is 1.2 percent and 7.1 percent by volume in air, respectively.

Toluene enters the environment when you use materials that contain it, such as paints, paint thinners, adhesives, fingernail polish, and gasoline. As you work with these materials, the toluene evaporates and becomes mixed with the air you breathe. Toluene enters surface water and groundwater (wells) from spills of solvents and petroleum products as well as from leaking underground storage tanks at gasoline stations and other facilities. Leaking underground storage tanks also contaminate the soil with toluene and other petroleum-product components.

When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil and water near the waste site. Toluene does not usually stay in the environment; it is readily broken down to other chemicals by microorganisms in soil and evaporates from surface water and surface soils. Toluene dissolved in well water does not break down quickly while the water is under the ground because there are few microorganisms in underground water. Once the water is brought to the surface, the toluene will evaporate into the air. Toluene can be taken up into fish and shellfish, plants, and animals living in water containing toluene, but it does not concentrate or build up to high levels because most animal species can break down the toluene into other compounds that are excreted.

Identification:

- Chemical Name: toluene
- Regulatory Name: toluene
- Formula: $C_6H_5CH_3$
- DOT Label: 1294
- CAS: 108-88-3
- CHRIS: TOL

- UN Number: 1294

Health Effects:

Toluene can enter your body when you breathe its vapors or eat contaminated food or drink contaminated water. When you work with toluene-containing paints or paint thinners, or use nail polish or nail polish remover containing toluene, the toluene can also pass through your skin into your bloodstream. You are exposed to toluene when you breathe air containing toluene. When this occurs the toluene is taken directly into your blood from your lungs. Where you live, work, and travel and what you eat affect your daily exposure to toluene. Factors such as your age, sex, body composition, and health status affect what happens to toluene once it is in your body. After being taken into your body, more than 75% of the toluene is removed within 12 hours. It may leave your body unchanged in the air you breathe out or in your urine after some of it has been changed to other chemicals. Generally, your body turns toluene into less harmful chemicals such as hippuric acid.

A serious health concern is that toluene may have an effect on your brain. Toluene can cause headaches and sleepiness, and can impair your ability to think clearly. Whether or not toluene does this to you depends on the amount you take in, how long you are exposed, and your genetic susceptibility and age. Low to moderate, day-after-day exposure in your workplace can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, and loss of appetite. These symptoms usually disappear when exposure is stopped. You may experience some hearing and color vision loss after long-term daily exposure to toluene in the workplace. Researchers do not know if the low levels of toluene you breathe at work will cause any permanent effects on your brain or body after many years. If you are exposed to a large amount of toluene in a short time because you deliberately sniff paint or glue, you will first feel light-headed. If exposure continues, you can become dizzy, sleepy, or unconscious. You might even die. Toluene causes death by interfering with the way you breathe and the way your heart beats. When exposure is stopped, the sleepiness and dizziness will go away and you will feel normal again. If you choose to repeatedly breathe in toluene from glue or paint thinners, you may permanently damage your brain. You may also experience problems with your speech, vision, or hearing, have loss of muscle control, loss of memory, poor balance, and decreased mental ability. Some of these changes may be permanent.

Toluene (at high levels) could possibly damage your kidneys. If you drink alcohol and are exposed to toluene, the combination can affect your liver more than either compound alone. Combinations of toluene and some common medicines like aspirin and acetaminophen may increase the effects of toluene on your hearing. Some studies in people have shown reproductive effects, such as an increased risk of spontaneous abortions, from exposure to toluene in the workplace. However, other factors, such as exposure to other chemicals, smoking and alcohol use, may have affected the results of the studies, so it is not possible to say whether toluene has reproductive effects in people. The effects of toluene on animals are similar to those seen in humans. The main effect of toluene is on the brain and nervous system, but animals exposed to moderate or high levels of toluene may also show harmful effects in their liver, kidneys, and lungs. Studies in workers and animals exposed to toluene generally indicate that toluene does not cause cancer. The International Agency for Research on Cancer (IARC) and the Department of

Health and Human Services (DHHS) have not classified toluene for carcinogenic effects. The EPA has determined that toluene is not classifiable as to its human carcinogenicity.

Regulation:

OSHA has set a limit of 200 ppm of toluene for air in the workplace, averaged for an 8-hour exposure per day over a 40-hour workweek. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends that toluene in workplace air not exceed 50 ppm, and NIOSH recommends that toluene in workplace air not exceed 100 ppm (both as average levels over 8 hours). EPA has set a maximum contaminant level (MCL) for toluene in drinking water of 1 milligram per liter of water (1 mg/L). Any release of more than 1,000 pounds of this chemical to the environment must be reported to the National Response Center.

Xylenes

Exposure Values:

- IDLH: 900 ppm
- TLV TWA: 100 ppm; ST 150 ppm
- NIOSH REL: 100 ppm (434 mg/m^3); C 150 ppm
- OSHA PEL: TWA 100 ppm (434 mg/m^3)

Description:

There are three forms of xylene in which the methyl groups vary on the benzene ring: metaxylene, ortho-xylene, and para-xylene (m-, o-, and p-xylene). These different forms are referred to as isomers. Xylene is also known as xylol or dimethylbenzene. Xylene is primarily a synthetic chemical. Chemical industries produce xylene from petroleum. Xylene also occurs naturally in petroleum and coal tar and is formed during forest fires. It is a colorless, flammable liquid with a sweet odor.

Xylene is one of the top 30 chemicals produced in the United States in terms of volume. It is used as a solvent in the printing, rubber, and leather industries. Along with other solvents, xylene is also used as a cleaning agent, a thinner for paint, and in varnishes. It is found in small amounts in airplane fuel and gasoline. Xylene is used as a material in the chemical, plastics, and synthetic fiber industries and as an ingredient in the coating of fabrics and papers. Isomers of xylene are used in the manufacture of certain polymers (chemical compounds), such as plastics.

Xylene evaporates and burns easily. Xylene does not mix well with water; however, it does mix with alcohol and many other chemicals. Most people begin to smell xylene in air at 0.08-3.7 ppm and begin to taste it in water at 0.53-1.8 ppm.

Chemical Properties:

Xylene is a liquid, and it can leak into soil, surface water, or groundwater, where it may remain for months or more before it breaks down into other chemicals. However, because it evaporates

easily, most xylene (if not trapped deep underground) goes into the air, where it stays for several days. In the air, the xylene is broken down by sunlight into other less harmful chemicals.

Xylene can enter the environment when it is made, packaged, shipped, or used. Most xylene that is accidentally released evaporates into the air, although some is released into rivers or lakes. Xylene can also enter soil, water, or air in large amounts after an accidental spill or as a result of an environmental leak during storage or burial at a waste site. Xylene very quickly evaporates into the air from surface soil and water. Xylene stays in the air for several days until it is broken down by sunlight into other less harmful chemicals.

Most xylene in surface water evaporates into the air in less than a day. The rest of it is slowly broken down into other chemicals by small living organisms in the water. Only very small amounts are taken up by plants, fish, and birds. We do not know exactly how long xylene stays in water, but we do know that it stays longer in underground water than in lakes and rivers, probably because it can evaporate from the latter.

Xylene evaporates from soil surfaces. Xylene below the soil surface stays there for several days and may travel down through the soil and enter underground water (groundwater). Small living organisms in soil and groundwater may transform it into other less harmful compounds, although this happens slowly. It is not clear how long xylene remains trapped deep underground in soil or groundwater, but it may be months or years. Xylene stays longer in wet soil than in dry soil. If a large amount of xylene enters soil from an accidental spill, a hazardous waste site, or a landfill, it may travel through the soil and contaminate drinking water wells. Only a small amount of xylene is absorbed by animals that live in water contaminated with xylene.

Xylene vapor may explode if ignited in a closed area. The LEL and UEL of xylene is 1.1 percent and 6.6 percent by volume in air, respectively.

Identification:

- Chemical Name: xylenes
- Regulatory Name: xylenes
- Formula: $C_6H_4(CH_3)_2$
- DOT Label: 1307
- CAS: 108-38-3 (m-Xylene); 95-47-6 (o-Xylene); 106-42-3 (p-Xylene); 1330-20-7 (mixed isomers)
- CHRIS: XLM (m-Xylene); XLO (o-Xylene); XLP (p-Xylene)
- UN Number: 1397

Health Effects:

Xylene is most likely to enter the body via inhalation. It is rapidly absorbed by the lungs, and the amount of xylene retained ranges from 50% to 75% of the amount of xylene inhaled. Physical exercise increases the amount of xylene absorbed by the lungs. Less often, xylene enters the body through ingestion or dermal absorption. Absorption of xylene after eating food or drinking water containing it is both rapid and complete. Absorption of xylene through the skin also occurs

rapidly following direct contact with xylene. Absorption of xylene vapor through the skin is lower than absorption of xylene vapor by the lungs. However, it is not known how much of the xylene is absorbed through the skin. Xylene passes into the blood soon after entering the body.

In people and laboratory animals, xylene is broken down into other chemicals, especially in the liver. This process changes most of the xylene that is breathed in or swallowed into a different form. Once xylene breaks down, the breakdown products rapidly leave the body, mainly in urine, but some unchanged xylene also leaves in the breath from the lungs. One of the breakdown products of xylene, methylbenzaldehyde, is harmful to the lungs of some animals. This chemical has not been found in people exposed to xylene. Small amounts of breakdown products of xylene have appeared in the urine of people as soon as 2 hours after breathing air containing xylene. Usually, most of the xylene that is taken in leaves the body within 18 hours after exposure ends. Storage of xylene in fat or muscle may prolong the time needed for xylene to leave the body.

Short-term exposure of people to high levels of xylene can cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; impaired function of the lungs; delayed response to a visual stimulus; impaired memory; stomach discomfort; and possible changes in the liver and kidneys. Both short- and long-term exposure to high concentrations of xylene can also cause a number of effects on the nervous system, such as headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. People exposed to very high levels of xylene for a short period of time have died. Most of the information on long-term exposure to xylene is from studies of workers employed in industries that make or use xylene. Those workers were exposed to levels of xylene in air far greater than the levels normally encountered by the general population. Many of the effects seen after their exposure to xylene could have been caused by exposure to other chemicals that were in the air with xylene.

Results of studies of animals indicate that large amounts of xylene can cause changes in the liver and harmful effects on the kidneys, lungs, heart, and nervous system. Short-term exposure to very high concentrations of xylene causes death in animals, as well as muscular spasms, uncoordination, hearing loss, changes in behavior, changes in organ weights, and changes in enzyme activity. Long-term exposure of animals to low concentrations of xylene has not been well studied.

Information from animal studies is not adequate to determine whether or not xylene causes cancer in humans. Both the International Agency for Research on Cancer (IARC) and EPA have found that there is insufficient information to determine whether or not xylene is carcinogenic and consider xylene not classifiable as to its human carcinogenicity. Exposure of pregnant women to high levels of xylene may cause harmful effects to the fetus.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, decreased weight, skeletal changes, and delayed skeletal development. In many instances, these same concentrations also cause damage to the mothers. The higher the exposure and the longer the exposure to xylene, the greater the chance of harmful health effects. Lower concentrations of xylene are not so harmful.

Regulation:

ATSDR has derived acute, intermediate and chronic duration inhalation Minimal Risk Levels (MRLs) of 1, 0.7 and 0.1 ppm for mixed xylene, respectively. Following oral exposure, an acute MRL of 1 mg/kg/day for p-xylene, and intermediate MRLs of 0.2 and 0.6 mg/kg/day for mixed xylene and m-xylene have been derived. EPA (IRIS 1994) has derived an oral reference dose (RfD) for xylene of 2 mg/kg/day with an uncertainty factor of 100, based on a dose-related increase in mortality of male rats in a 2-year feeding study (NTP 1986). An inhalation reference concentration (RfC) for xylene is under review by an EPA work group. Xylene is on the list of chemicals appearing in "Toxic Chemicals Subject to Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986" (EPA 1987a).

6.2 PHYSICAL HAZARDS

Physical hazards such as slips, trips, and falls may occur. Workers must walk cautiously at a site to avoid tripping, especially when uneven terrain is present. Vehicles used at a site can strike workers. While driving in reverse, the operator usually has a more limited field of view than while driving forward and must observe extra caution. Such vehicles must be equipped with a backup alarm to warn workers that the vehicles are moving in reverse. Any driver-operated equipment (truck, tractor) used on a site with uneven terrain must have some form of rollover protection.

Accidents in manual handling of materials are primarily the result of unsafe working habits improper lifting, carrying too heavy a load, incorrect gripping, or failing to wear personal protective equipment. These may be avoided by testing the weight of an object before attempting to lift and carry it. If it is too heavy, get help, and if possible, use mechanical lifting aids. The proper method for lifting is:

- Get a good footing;
- Place feet about shoulder width apart;
- Bend knees to pick up load;
- Never bend from waist;
- Keep back straight;
- Get a firm hold;
- Grasp opposite corners of the load, if possible;
- Keep the back as upright as possible;

- Lift gradually by straightening the legs--don't jerk the load;
- Keep the weight as close to the body as possible;
- When changing directions, turn the entire body, including the feet; and
- Don't twist the body.

Information on other physical hazards is provided below and in Section 10.

6.3 HEAT STRESS RECOGNITION AND CONTROL

The wearing of Personal Protective Equipment (PPE) can place a hazardous waste worker at considerable risk of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites, regular monitoring and other preventive precautions are vital.

Heat stress monitoring should commence when personnel are wearing PPE, including Tyvek-type coveralls, and the ambient temperature exceeds 70^{o}F. If standard work garments (cotton coveralls) are worn, monitoring should commence at 85^{o}F. Heat stress monitoring and control guidance can be found in Appendix C.

6.4 NOISE HAZARDS

The primary noise hazard at this Site could be from the heavy type equipment used in the various phases of this project. Previous surveys indicate that such equipment may produce continuous and impact noise at or above the action level of 85 dBA. All on-site personnel within 25 feet of operating equipment will wear hearing protective devices (either muffs or plugs). Personnel will wash their hands with soap and water prior to inserting earplugs to avoid initiating ear infections.

6.5 ELECTRICAL HAZARDS

Safety related work practices will be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts. Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if workers contact or sever them during field operations.

To minimize electrical hazards, low-voltage (below 250 volts AC) equipment with ground-fault interrupters (GFI) and watertight, corrosion resistant cables must be used for outdoor work on-site. GFI should be used on all circuits carrying electrical power from an indoor source or a portable generator to outdoor equipment or lightning, worn switches and wiring should be quickly repaired and use of water should be controlled, equipment should also be properly grounded as protection against shock, static electricity, and lightning. The ignition of flammable vapors from spark producing electrical equipment, also pose a hazard. The level of flammable vapors will be monitored and protective measures will be followed.

6.6 UNDERGROUND UTILITIES AND PIPELINES

On-site personnel will attempt to locate all underground utility and pipeline locations prior to commencement of drilling or excavation activities. Resources include Site plans, utility companies, and Underground Services Alert or its regional equivalent. The deactivation of utilities and pipelines, if necessary, should be certified by the proper utility company or CORCO personnel, and the certification retained in the permanent log.

6.7 WORK AREA PROTECTION

As the project operations may be undertaken in a roadway or parking lot, motor vehicles may be a hazard. Guidance on properly coning and flagging the work area is located in Sections 8 and 10. Consideration should be given to parking a work vehicle within the coned area between the work area and oncoming traffic.

6.8 HAZARD COMMUNICATION

The Hazard Communication Program complies with the OSHA Hazard Communication Standard found in 29 CFR 1910.1200 and 29 CFR 1926.59, which applies to any chemical present in the

workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency. Although waste materials are excluded from the OSHA requirement, decontamination chemicals for sampling apparatus or protective clothing (such as acetone or trisodium phosphate) and calibration standards (such as isobutylene gas) require Material Safety Data Sheets (MSDS).

The principle of communicating the hazards of materials used in the workplace to employees applies broadly to firm wide activities, from informational programs on the conduct of hazardous waste activities to the firm's insistence upon adequate safety and health training. It is also important for personnel to have an awareness of client concern for Hazard Communication due to Federal, state, and local regulations directly affecting certain client activities.

Therefore it has been determined the in order to comply with Hazard Communication Standard (29 CFR 1910.1200), it has been determined that:

- All containers of hazardous chemicals must be appropriately labeled or tagged to identify the hazard and provide information on effects and appropriate protective measures;

- Labels, tags, or signs must be properly affixed and visible at all times while a hazard is present and removed promptly when the hazard no longer exists;

- Written information (MSDS) on hazardous chemicals in the workplace must be available to employees working with the substance;

- Appropriate MSDS will be available to any contractor or subcontractor employees working in this project; and

- Hazard Communication Training or equivalent should be provided to on-site employees.

6.9 CONTROL OF HAZARDOUS ENERGY SOURCES

This standard covers the servicing and maintenance of machines and equipment in which the "unexpected" energization or startup of the machines or equipment, or release of stored energy could cause injury to employees. It establishes minimum performance requirements for the

control of such hazardous energy. This section requires employers to establish a program and utilize procedures for affixing appropriate lockout or tag out devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees.

Below are definitions applicable for this section:

"Lockout." The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

"Lockout device." A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

"Tag out." The placement of a tag out device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tag out device is removed.

"Tag out device." A prominent warning device, such as a tag and a means of appendix, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tag out device is removed.

Procedure

Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

The employer need not document the required procedure for a particular machine or equipment, when all of the following elements exist:

[1] The machine or equipment has no potential for stored or residual energy or reaccumulation of

stored energy after shut down which could endanger employees;

[2] The machine or equipment has a single energy source which can be readily identified and isolated;

[3] The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment;

[4] The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;

[5] A single lockout device will achieve a locker-out condition;

[6] The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance;

[7] The servicing or maintenance does not create hazards for other employees; and

[8] The employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

The established procedures for the application of energy control (the lockout or tag out procedures) shall cover the following elements and actions and shall be done in the following sequence:

1. "Preparation for shutdown." Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

2. "Machine or equipment shutdown." The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

3. "Machine or equipment isolation." All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

4. Lockout or tag out devices shall be affixed to each energy isolating device by authorized employees.

5. Lockout devices, where used, shall be affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position.

6. Tag out devices, where used, shall be affixed in such a manner as to clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

7. Where tag out devices are used with energy isolating devices designed with the capability of being locked, the tag appendix shall be fastened at the same point at which the lock would have been attached.

8. Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

9. Following the application of lockout or tag out devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

10. If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

11. "Verification of isolation." Prior to starting work on machines or equipment that have been

locked out or tagged out; the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished.

12. "Release from lockout or tag out." Before lockout or tag out devices are removed and energy is restored to the machine or equipment.

13. "The machine or equipment." The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

14. The work area shall be checked to ensure that all employees have been safely positioned or removed.

15. Before lockout or tag out devices are removed and before machines or equipment are energized, affected employees shall be notified that the lockout or tag out devices have been removed.

16. After lockout or tag out devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tag out device(s) have been removed.

17. "Lockout or tag out devices removal." Each lockout or tag out device shall be removed from each energy isolating device by the employee who applied the device. When the authorized employee who applied the lockout or tag out device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program.

6.9.1 Equipment

Equipment specifications

1. Lockout and tag out devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

2. Tag out devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.

3. Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

4. "Standardized." Lockout and tag out devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tag out devices, print and format shall be standardized.

5. "Lockout devices." Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

6. "Tag out devices." Tag out devices, including their means of appendix, shall be substantial enough to prevent inadvertent or accidental removal. Tag out device appendix means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.

7. "Identifiable." Lockout devices and tag out devices shall indicate the identity of the employee applying the device(s).

8. Tag out devices shall warn against hazardous conditions if the machine or equipment is

energized and shall include a legend such as the following: **"Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate."**

9.Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

10. When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

11. Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

12. Tags and their means of appendix must be made of materials which will withstand the environmental conditions encountered in the workplace.

13. Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

14. Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

Equipment Inspections

1. The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

2. The periodic inspection shall be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected.

3. The periodic inspection shall be conducted to correct any deviations or inadequacies identified.

4. Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.

5. Where tag out is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected.

6. The employer shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

Training and Communication

1. The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees.

2. Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.

3. Each affected employee shall be instructed in the purpose and use of the energy control procedure.

4. All other employees whose work operations are or may be in an area where energy control

procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

When tag out systems are used, employees shall also be trained in the following limitations of tags:

- Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

- Additional retraining shall also be conducted whenever there is a periodic inspection or when the employer has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

- The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

- The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

6.10 HEAVY EQUIPMENT

Operation of heavy equipment during construction and maintenance activities presents potential physical hazards to personnel. The following precautions should be observed whenever heavy equipment is in use:

- PPE such as steel-toed shoes, safety glasses or goggles, and hard hats should be worn whenever such equipment is present;

- Personnel should at all times be aware of the location and operation of heavy equipment, and take precautions to avoid getting in the way of its operation. Never assume that the

equipment operator sees you; make eye contact and use hand signals to inform the operator of your intent;

- Traffic safety vests are required for on-site personnel working near mobile heavy equipment, such as backhoes or other excavators;

- Never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge;

- When an equipment operator must operate in tight quarters, the equipment subcontractor should provide a person to assist in guiding the operator's movements;

- Keep all non-essential personnel out of the work area; and

- All heavy equipment that is used in the exclusion zone (defined in Section 8.1) should remain in that zone until its task is completed. The equipment subcontractor should completely decontaminate such equipment in the designated equipment decontamination area as required.

6.11 CLEARANCE OF NEW EQUIPMENT AND PROCESSES AT THE CORCO FACILITY

- All new or modified transfer system, machinery or processes and all new building additions or structure modifications at CORCO must be reviewed and approved by the Safety and Health / Environmental Department before they are used or occupied by regular employees. The purpose of this procedure is to identify and eliminate hazards which may cause accidents / incidents, personal injuries or damage to company property and equipment and to prevent the use of sub-standard methods or equipment's by company personnel.
- All Corporate Construction Engineering projects reviews will be handled with the National Health and Safety Staff. Local projects will be handled by local staff. The

Engineering or Maintenance Department is normally responsible for the design or installation of new equipment, processes, tanks, transfer systems, spill collection systems, building structures, etc. Therefore, the person in these departments in charge of any specific assignment will have the responsibility to adhere to all engineering standards and to incorporate all the necessary safety features in the project for the prevention of injuries and/or fires. The person in charge of the project, the Department Manager of the concerned operation, the designated Safety Administrator and the Plant or Project Engineer will also be responsible for completing the appropriate safety checklist and authorizing Safety Clearance prior to use by Company personnel.

- Any person who uses equipment on a rental or trial basis also has the responsibility for insuring that such equipment is reviewed with the Safety and Health / Environmental Department.

The Safety and Health / Environmental approval for clearance of new equipment and processes will be determined by the following steps:

1. The Manager of the operating department where such transfer processes or machinery will be used should not permit employees to operate the equipment until Safety and Health Department / Environmental approval has been granted.
2. Equipment must be thoroughly checked before usage to determine if it is going to be operated for the same purpose and within limits for which it was originally designed.
3. The standards and regulations that may apply to many projects are too numerous and complicated to repeat here. Make sure state and/or federal requirements are met in order to achieve compliance from a regulatory standpoint.
4. All such projects including plant equipment, new transfer processes, containment structures and spill collection systems must, at a minimum, conform to all applicable engineering standards (ANSI, FM, UL, and NFPA), company policies, government regulations, insurance requirements, and national consensus standards.
5. Projects which require approvals from any federal and/or state agency (EPA, EQB,

OSHA, PROSHO, USCG, etc), or insurance carriers should be coordinated with the person/persons at the site who are assigned to act as liaison between these agencies. Plans and details should be reviewed together with the liaison, engineer, and the agency concerned.

6. The persons assigned to the project should also periodically consult with the Safety and Health / Environmental Department as the project progresses. It is usually best to begin this consultation process as early as possible so that any special Safety and Health / Environmental concerns can be considered in the design stage of the project and/or process.

Before the equipment is placed into actual use, Safety Clearance must be authorized by the responsible engineer, the department manager of the operating department concerned, the Plant or Project Engineer, the Safety Administrator or the Environmental Coordinator.

1. Safety Clearance should not be granted until all items listed in the CORCO safety check list have been complied with and that equipment is safe to operate.
2. Safety instructions in the operation mode and applications of the equipment should also be given in advance to all persons concerned by their supervisor. For all shifts at the facility, each supervisor should see that proper instructions are given.
3. When chemicals are being introduced employee "Right to Know" requirements defined on this HASP will be completed before employees work in the area.
4. A job Safety Analysis (JSA) must be developed by the Safety Administrator and reviewed with the Project Engineer, Environmental Coordinator, Supervisor, and employees before the start of the project and/or processes.

This procedure can also be applicable for clearing systems in cleaning and remediation activities.

Safety Clearance shall be considered granted when the appropriate clearance form is approved by each department.

7.0 EXPOSURE MONITORING PLAN

Heat stress, noise, and chemical exposures may be encountered at this Site. Heat stress monitoring and prevention is addressed in Section 5 and Appendix C. Noise levels will not be monitored; if heavy equipment is operating, on-site personnel will wear hearing protection as described in Section 5.4.

7.1 CHEMICAL EXPOSURE MONITORING

The field instrumentation described in this subsection has been specifically selected for the contaminants that may be reasonably anticipated to be encountered during the course of this project. Selection factors include anticipated airborne concentrations, potential interferences, ionization potentials, instrument sensitivity, and occupational exposure limits. The action levels described below are established with the expectation that these specific instruments will be used. **Do not substitute instruments without the consent of the SSO.**

Monitoring will be performed for the hazards presented this HSP to ensure proper selection of engineering controls, work practices, and PPE so that employees are not exposed to levels that exceed permissible exposure limits or published exposure levels for hazardous substances. Air monitoring will be performed to identify IDLH conditions, exposure over PELs or published exposure levels, or other dangerous conditions such as the presence of flammable atmospheres or oxygen-deficient environments. Periodic monitoring will be conducted in the event of an IDLH condition or flammable atmosphere or when there is an indication that exposure levels may have risen, such as:

- When work begins on a different portion of the Site; and

- When employees are working in areas with obvious liquid contamination (e.g., spill or lagoon).

A photoionization detector (PID) or colorimetric tubes will be used to monitor intermittently for hydrocarbon vapors. If readings exceed an average of 1 ppm above background for more than one minute, all work will be stopped until the potential source of such readings is identified and corrected as feasible.

7.2 BACKGROUND READINGS

All direct-reading instrument readings will be evaluated relative to background readings, not "meter zero". Prior to the start of work at each shift, and whenever there is a significant shift in wind direction, instrument readings will be obtained upwind of the Site work zone in order to determine the level of "background" readings from local vehicle traffic, emissions from nearby operations unrelated to the Site, etc. Site readings will be evaluated against these background readings (i.e., if an action level is listed as 5 ppm, it is evaluated as 5 ppm above background).

7.3 DATA LOGGING

All exposure monitoring data, including background readings, will be logged in the field log book. The results of daily instrument calibrations can either be logged on the form provided in Appendix A to the AMP or in the field log book. All monitoring instruments will be calibrated, in accordance with the manufacturer's instructions or the guidance found in Appendices B, C, D, and E of the AMP, prior to the start of each shift. Calibration should also be performed when inconsistent or erratic readings are obtained. **If an instrument cannot be calibrated to specification, or becomes otherwise inoperable, all invasive Site work (i.e., soil disturbing or excavating) will cease until the instrument is appropriately repaired or replaced**; the PM or SSO should be contacted for further guidance.

7.4 DUST CONTROL

Elevated levels of contaminants have been identified during previous investigations at the Site. Airborne exposure could potentially occur to the VOCs, SVOCs, and metals identified in Section 5.1 of this Plan during excavation or soil sampling operations. If activities subject to this HSP generate sustained visible dust, a water mist will be applied to reduce dust generation. If the mist is not effective in reducing dust generation, personnel will don respirators (half-face as appropriate for analyzer readings) with combination organic vapor-HEPA cartridges (such as MSA's GMC-H cartridges).

8.0 PERSONAL PROTECTIVE EQUIPMENT

PPE that will protect employees from the hazards and potential hazards likely to be encountered during activities subject to this HASP will be used. PPE selection is based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the Site, the task-specific conditions and duration, and the hazards and potential hazards identified at the Site. The level of protection provided is increased when Site conditions deem it necessary to reduce employee exposures to below permissible exposure limits and published exposure levels for hazardous substances. Since the use of PPE is highly strenuous in the working conditions/environment typically found during activities subject to this HSP, the implementation of appropriate engineering controls and safe work practices will be stressed prior to using respiratory protection or protective clothing beyond a Tyvek coverall.

Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.
Defective or damaged personal protective equipment shall not be used.
All personal protective equipment shall be of safe design and construction for the work to be performed. The employer shall provide training to each employee who uses PPE. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required, the employer shall retrain each such employee.

The employer shall verify that each affected employee has received and understood the required training through a written certification that contains the name of each employee trained, the date(s) of training, and that identifies the subject of the certification.

This section is intended to provide compliance assistance for hazard assessment, selection of personal protective equipment (PPE) and PPE training. It neither adds to nor detracts from the employer's responsibility to comply with these provisions.

Minimum Protective Equipment for Site Personnel:

- Hard hat;
- Tyvek coveralls,
- Work gloves, or vinyl gloves as appropriate,
- Safety glasses; and
- Steel-toed boots.

8.1 LIMITATIONS OF PROTECTIVE CLOTHING

The protective equipment ensembles selected for this project are anticipated to provide protection against the types and concentrations of hazardous materials that may potentially be encountered during field operations. However, no protective garment, glove, or boot is resistant to all chemicals at any concentration; in fact, chemicals may continue to permeate or degrade a garment even after the source of contamination is removed.

In order to obtain optimum usage from PPE, the procedures listed below are to be followed by all On-site personnel:

- When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift;

- Inspect all clothing, gloves, and boots both prior to and during use for:

    - Imperfect seams
    - Non-uniform coatings
    - Tears
    - Poorly functioning closures;

- Inspect reusable garments, boots, and gloves both prior to and during use for:

    - Visible signs of chemical permeation such as swelling, discoloration, stiffness, or brittleness;
    - Cracks or any signs of puncture or abrasion; and

- Any reusable garments exhibiting any such characteristics will be discarded.

- Any work that would make necessary the use of chemical protective clothing will be addressed under a site-specific HASP

8.2 DURATION OF WORK TASKS

Rest breaks are to be taken in clean areas after personnel have completed the decontamination process, including soap and water wash of hands and face. Additional rest breaks will be scheduled according to heat stress monitoring protocols as described in the Appendix C.

8.3 MANAGEMENT OF HAZARDS

1. **Controlling Hazards**. Employers and employees should not rely exclusively on PPE for protection from hazards. PPE should be used, where appropriate, in conjunction with engineering controls, guards, and safe work practices and procedures.

2. **Assessment and Selection**. Employers need to consider certain general guidelines for assessing the hazardous situations that are likely to arise under foreseeable work activity conditions and to match employee PPE to the identified hazards. The employer should designate a safety officer or some other qualified person to exercise common sense and appropriate expertise to assess work activity hazards and select PPE.

3. **Assessment Guidelines**. In order to assess the need for PPE the following steps should be taken:

a. Survey. Conduct a walk-through survey of the area in question to identify sources of hazards.

Categories for Consideration:
(1) Impact
(2) Penetration

(3)Compression (rollover)

(4) Chemical

(5) Heat

(6) Harmful dust

(7) Light (optical) radiation

(8) Drowning

(9) Falling

b. Sources. During the walk-through survey the safety officer should observe:

(1) Sources of motion; for example, machinery or processes where any movement of tools, machine elements or particles could exist, or movement of personnel that could result in collision with stationary objects.

(2) Sources of high temperatures that could result in burns, eye injury or ignition of protective equipment.

(3) Types of chemical exposures.

(4) Sources of harmful dust.

(5) Sources of light radiation, for instance, welding, brazing, cutting, heat treating, furnaces, and high intensity lights.

(6) Sources of falling objects or potential for dropping objects.

(7) Sources of sharp objects which might pierce or cut the hands.

(8) Sources of rolling or pinching objects which could crush the feet.

(9) Layout of work place and location of co-workers.

(10) Any electrical hazards.

(11) Review injury/accident data to help identify problem areas.

c. Organize data. Following the walk-through survey, it is necessary to organize the data and other information obtained. That material provides the basis for hazard assessment that enables

the employer to select the appropriate PPE.

d. Analyze data. Having gathered and organized data regarding a particular occupation, employers need to estimate the potential for injuries. Each of the identified hazards should be reviewed and classified as to its type, the level of risk, and the seriousness of any potential injury. Where it is foreseeable that an employee could be exposed to several hazards simultaneously, the consequences of such exposure should be considered.

4. **Selection Guidelines**. After completion of the procedures in paragraph 3, the general procedure for selection of protective equipment is to:

(a) become familiar with the potential hazards and the types of protective equipment that are available, and what they can do; for example, splash protection, and impact protection;

(b) Compare the hazards associated with the environment; for instance, impact velocities, masses, projectile shapes, radiation intensities, with the capabilities of the available protective equipment;

(c) Select the protective equipment which ensures a level of protection greater than the minimum required to protect employees from the hazards; and

(d) Fit the user with the protective device and give instructions on care and use of the PPE. It is very important that users be made aware of all warning labels and limitations of their PPE.

5. **Fitting the Device**. Careful consideration must be given to comfort and fit. The employee will be most likely to wear the protective device if it fits comfortably. PPE that does not fit properly may not provide the necessary protection, and may create other problems for wearers. Generally, protective devices are available in a variety of sizes and choices. Therefore employers should be careful to select the appropriate sized PPE.

6. **Selection Guidelines for Head Protection**. Hard hats are designed to provide protection

from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn. When selecting head protection, knowledge of potential electrical hazards is important. Class A helmets, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors. (They are proof tested to 2,200 volts.) Class B helmets, in addition to impact and penetration resistance; provide electrical protection from high-voltage conductors, (they are proof tested to 20,000 volts). Class C helmets provide impact and penetration resistance. (They are usually made of aluminum, which conducts electricity and should not be used around electrical hazards.)

(b) Where falling object hazards are present, head protection must be worn. Some examples of exposure include: working below other workers who are using tools and materials which could fall; working around or under conveyor belts which are carrying parts or materials; working below machinery or processes which might cause material or objects to fall.

7. **Selection Guidelines for Foot Protection**.

(a) Safety shoes and boots must meet ANSI Z41-1991 and provide impact and compression protection to the foot. Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal (top of foot) protection should be provided, and in some other special situations, electrical conductive or insulating safety shoes would be appropriate.

(b) Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped, and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employees' feet. Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal etc., could be stepped on by employees, causing an injury.

8. **Selection Guidelines for Hand Protection**.

(a) Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. OSHA is unaware of any gloves that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused.

(b) It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated, e.g., chemical hazards, cut hazards, and flame hazards. These performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated.

(c) Other general factors to be considered for glove selection are:

(A) As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types; and,

(B) The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure to the hazard, and the physical stresses that will be applied.

(d) With respect to selection of gloves for protection against chemical hazards:

(A) The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin or to pass through the skin and cause systemic effects or both;

(B) Generally, any "chemical resistant" glove can be used for dry powders;

(C) For mixtures and formulated products (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials; and,

(D) Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

9. **Cleaning and Maintenance.**

(a) It is important that all PPE be kept clean and be properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision.

(b) For the purposes of compliance, PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection.

(c) It is important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

10. **Devices with Adjustable Features**

(a) Adjustments should be made on an individual basis so the wearer will have a comfortable fit that maintains the protective device in the proper position. Particular care should be taken in fitting devices for eye protection against dust and chemical splash to ensure that the seal is appropriate for the face.

(b) In addition, proper fitting of hard hats is important to ensure that the hard hat will not fall off during work operations. In some cases a chin strap may be necessary to keep the hard hat on an employee's head. (Chin straps should break at a reasonably low force to prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed

carefully.

11. **Reassessment of Hazards**. Compliance with the hazard assessment will involve the reassessment of work activities where changing circumstances make it necessary. The employer should have a safety officer or other qualified person reassess the hazards of the work activity area as necessary. This reassessment should take into account changes in the workplace or work practices, such as those associated with the installation of new equipment, and the lessons learned from reviewing accident records, and a reevaluation performed to determine the suitability of PPE selected for use.

(a) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.

(b) Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.

(c) Face shields should only be worn over primary eye protection (spectacles or goggles).

(d) As required by the standard, filter lenses must meet the requirements for shade designations . Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

(e) Persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eye wear.

(f) Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.

(g) Caution should be exercised in the use of metal frame protective devices in electrical

hazard areas.

(h) Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.

(i) Welding helmets or face shields should be used only over primary eye protection (spectacles or goggles).

(j) Non-side shield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."

(k) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.

(l) Protection from light radiation is directly related to filter lens density. See note (d). Select the darkest shade that allows task performance.

8.4 RESPIRATORY PROTECTION

In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used.

Respirator Selection

The employer shall select and provide an appropriate respirator based on the respiratory

hazard(s) to which the worker is exposed and workplace and user factors that affect respirator performance and reliability. The chemical state and physical form of the contaminant(s) shall also be taken into account.

The respirator which is provided will be adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.

The respirator will be NIOSH-certified and will be used in compliance with the conditions of its certification.

Medical Evaluation

Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used.
The employer shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace.

The employer shall ensure that a follow-up medical examination is provided. The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

In determining the employee's ability to use a respirator, the employer shall: Obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP. The recommendation shall provide only the following information:

- Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator.

- The need, if any, for follow-up medical evaluations and a statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

Fit Testing

The employer shall ensure that employees using a tight-fitting face piece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT).

The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The fit testing shall be repeated whenever a different respirator face piece (size, style, model or make) is used, and at least annually thereafter.

If after passing a QLFT or QNFT, the employee subsequently notifies the employer, program administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator face piece and to be retested.

The employer shall conduct an additional fit test whenever the employee reports, or the employer, PLHCP, supervisor, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

Face piece seal protection

The employer shall not permit respirators with tight-fitting face pieces to be worn by employees who have:

(a) Facial hair that comes between the sealing surface of the face piece and the face or that

interferes with valve function.

(b) Any condition that interferes with the face-to-face piece seal or valve function.

(c) If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the face piece to the face of the user.

(d) For all tight-fitting respirators, the employer shall ensure that employees perform a user seal check each time they put on the respirator using the procedures recommended by the respirator manufacturer that the employer demonstrates effectiveness.

When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the employer shall reevaluate the continued effectiveness of the respirator.

Training and Information

Training will include putting on and removing the respirators, any limitations on their use, and their maintenance.

(a) The training must be comprehensive, understandable, and recur annually, and more often if necessary.

(b) The employer shall ensure that each employee can demonstrate knowledge of at least the following:

1. Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
2. What the limitations and capabilities of the respirator are.

3. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
4. How to inspect, put on and remove, use, and check the seals of the respirator.
5. What the procedures are for maintenance and storage of the respirator.
6. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
7. The training shall be conducted in a manner that is understandable to the employee.
8. The employer shall provide the training prior to requiring the employee to use a respirator in the workplace.

Program Evaluation

The employer shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being adopted.

Storage

Respirators shall be stored in accordance with any applicable manufacturer instructions.

Maintenance and care of respirators

The employer shall provide for the cleaning and disinfecting, storage, inspection, and repair of respirators used by employees.

Repairs

The employer shall ensure that respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded, repaired or adjusted.

Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed.

Identification of Filters, Cartridges, and Canisters

The employer shall ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

Record Keeping

The employer must establish and retain written information regarding medical evaluations, fit testing, and the respirator program. This information will facilitate employee involvement in the respirator program, assist the employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA.

9.0 SITE CONTROL

The purpose of site control is to minimize potential contamination of workers, protect the public from the Site's hazards, and prevent vandalism. Site control is especially important in emergency situations. Several site control procedures will be implemented to reduce worker and public exposure to chemical, physical, biological, and safety hazards.

Barricades and barricade tape should be used to delineate a work zone for safety purposes around the work area. The barriers should be set in a 25-foot radius (as practical) around the work area to provide sufficient maneuvering space for personnel and equipment. A short piece of barricade tape can be affixed to a secure upright to serve as a wind-direction telltale. A five-foot opening in the barricades upwind of the work area will serve as the personnel and equipment entry and exit point. The personnel decontamination station will be established at this point if formal decontamination procedures are required (see 9.0). All entry to and exit from the work area will be made at this opening in order to control potential sources of contamination and leave contaminated soil and debris in the work area.

At the end of the shift, all boring/sampling holes and excavations must be covered or otherwise secured. All cuttings and decontamination fluids are to be handled in accordance with relevant regulations and instructions from the PM.

The SSO will determine an upwind evacuation area prior to each shift, and all personnel will be notified of its location. A horn or other signaling device will be used to signal an evacuation in the event of an emergency. Three blasts of the horn will be the signal to immediately stop work and proceed to the evacuation area.

The SSO will see that all Site visitors sign the visitors' log and that all on-site personnel who enter the work zone do so only after presenting evidence of both their participation in a medical surveillance program and completion of health and safety training programs that fulfill the requirements of this plan.

The SSO will provide Site hazard and emergency action information to all Site visitors before they enter the Site; this can be done by providing a copy of the HSP to the visitor.

9.1 WORK ZONES

If field instrument readings exceed the first criteria referenced in Section 6.1, requiring the use of chemical protective equipment, a site specific HSP will be developed, and all work which does not conform to the HSP will be stopped.

9.2 OSHA INSPECTION PROCEDURES

The OSHA inspection procedure is provided to establish guidelines in the event of an OSHA inspection at our facilities in which maintenance and contractor operations are also affected.

The receptionist or security officer will notify appropriate management of OSHA Safety and Health Compliance Officer (CSHO) presence.

Safety Coordinator and management will serve as prime contact.

(a) Verify credentials.
(b) Obtain information concerning proposed inspection.
(c) Coordinate with Law Department.
(d) Help coordinate the inspection process.
(e) Help coordinate correction of items cited by OSHA CSHO

If an OSHA CSHO should come into our facilities, the receptionist or security officer will call the member of management noted below and inform them of the circumstances.

(a) Rolando H. Méndez ----------Ext. 234

The first management member contacted will notify other members of management as appropriate.

If at all possible, the Safety Coordinator will meet first with OSHA CSHO(S). If this is not possible, the following procedure should be followed:

1. Ask the CSHO(S) for their credentials. Have someone else verify the credentials by phone.

2. Ask the CSHO(S) the purpose of their visit.

3. If there is a warrant, obtain a copy of it.

4. If there is an employee complaint. Obtain a copy of it.

5. Obtain any other information for the reason why our facility was chosen for an inspection.

6. Obtain any other information giving the scope to any inspection to be conducted.

7. Explain to the CSHO(S) that you have been instructed to obtain clearance from our Law Department or Safety Department before permitting any inspection. Explain that you are not at this point refusing to allow the inspection but merely going through a required clearance procedure necessary by Company Policy.

8. Call one of our company attorneys. The attorney will discuss the possibilities with you and then advise whether the inspection should be allowed to proceed without a warrant and whether consent to such a warrantless search would be limited in any way. For instance, consent may be given to a warrantless search if an agreement is made to limit the inspection to the subject matter of the complaint.

If available, the Safety Coordinator will be the prime contact with OSHA CSHO prior to, during and after the inspection process. Every effort will be made to have the Safety Coordinator present for inspections of the audited locations.

An opening conference may be requested by the OSHA CSHO. At this meeting general aspects of the inspection will be discussed and various statistical data may be requested. A Field Reference Manual will serve as an inspection guideline by this OSHA CSHO in the audit process.A management representative will be assigned to each inspection team any photographs the CSHO(S) wish to take must be cleared throughout the Plant Manager and corporate Safety Department. If the area to be photographed is sensitive in nature, the inspectors will take special precautions for safeguarding such pictures. Management should take duplicate photographs of all those locations taken by the CSHO(S) if any data supplied to them is sensitive or confidential.

During the inspection process, all discrepancies noted by the CSHO(S) should immediately be brought to the attention of the area manager. Every effort should be made to correct as many discrepancies as possible before the CSHO(S) leaves the facility so that the corrected

discrepancies can be inspected again.

After the inspection is completed, a closing conference will be held to discuss findings. Selected members of management should be present as appropriate. If a CSHO requests an employee representative at any point of the inspection, a member of the facility Safety Committee will be called for.

The Safety Coordinator will notify the Corporate Safety Department of the inspection and keep them informed on its progress.

The Staff Team will help coordinate the compliance of any area cited during the inspection plus payment of any imposed fines.

10.0 DECONTAMINATION PROCEDURES

10.1 GENERAL

The following steps will be followed whenever personnel leave the work area:

- Remove all equipment. Obtain decontamination solutions and decontaminate the shovels, auger flights, etc. by brushing them under a water rinse. All waste and spent decon solutions will be properly contained;

- Scrub boots and gloves with a stiff bristle brush and water. Collect all rinsing's into an appropriate secondary containment.

- Remove outer gloves,

- Remove coverall; discard in provided container

- Remove hardhat and eye protection;

- Remove respirator

- Remove inner gloves; and

- Wash hands and face.

The decontamination area will be covered with plastic sheeting and/or similarly impervious flooring, which will be replaced when torn or heavily soiled, and at the end of each shift.

Each worker will be responsible for cleaning, sanitizing, and storing their own respirator in accordance with manufacturer's guidance (i.e., washing in warm water and detergent or sanitizing solution, air drying, and storing in a plastic storage bag). Cartridges will be changed as soon as breakthrough occurs (detection of organic vapor odor while wearing the respirator) and at the end of each shift. Respirators will be kept in storage bags or boxes when not in use.

All spend decontamination fluids (rinse waters, etc.) will be handled as directed by the PM and in accordance with relevant regulations.

10.2 STANDARD PROCEDURES

The following standard decontamination procedures will be followed during on-site operations:

1. A decontamination area should be located at the entrance to the work zone isolated as per discussion above.

2. All personnel should proceed through the appropriate contamination reduction sequence upon leaving the contamination area.

3. All protective gear should be left on-site during any lunch break following decontamination procedures.

4. MSDS for chemicals used during decontamination procedures should be made available to those who are potentially exposed to these chemicals.

5. See Section 11.10, Exposure to Blood borne Pathogens, for decontamination involving body fluids.

10.3 DECONTAMINATION OF EQUIPMENT

To the extent possible, measures should be taken to prevent contamination of sampling and monitoring equipment. Sampling devices may become contaminated; however, monitoring instruments, unless they are splashed, usually do not become contaminated. Once contaminated, it is difficult to clean instruments without damaging them. Any delicate instrument that cannot be decontaminated easily should have a bag taped and secured around it. Openings should be made in the bag for sample intake.

10.3.1 Sampling Devices

Sampling devices require special cleaning. Decontamination of all sampling equipment should be performed in accordance with approved quality assurance plans.

10.3.2 Tools

Wooden tools are difficult to decontaminate because they absorb chemicals. They should be kept on-site and handled only by protected workers. After use in a contaminated area, wooden tools should be discarded. For decontaminating other tools, refer to quality assurance plans or consult a laboratory.

10.3.3 Respirators

Certain parts of contaminated respirators, such as the harness assembly and cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded. Rubber components can be soaked in soap and water and scrubbed with a brush. Persons responsible for decontaminating respirators should be thoroughly trained in respirator maintenance.

10.3.4 Heavy Equipment

Bulldozers, trucks, backhoes, and other heavy equipment are difficult to decontaminate. Generally, they are washed with water under high pressure and/or accessible parts are scrubbed with detergent/water solution under pressure, if possible. In some cases, shovels, scoops, and lifts have been sand blasted or steamed. Particular care must be given to those components in direct contact with contaminants, such as tires and scoops.

10.3.5 Sanitizing of Personal Protective Equipment

Respirators, reusable protective clothing, and other personal articles not only must be decontaminated before being reused, but also must be sanitized. The inside of masks and clothing becomes soiled because of exhalation, body oils, and perspiration. The manufacturer's instructions should be followed to sanitize the respirator mask. If practical, protective clothing should be machine washed after a thorough decontamination; otherwise, it must be cleaned by hand.

10.3.6 Persistent Contamination

In some instances, clothing and equipment will become contaminated with substances that cannot be removed by normal decontamination procedures. A strong detergent (industrial grade) may be used to remove such contamination from equipment if it does not destroy or degrade the protective material. If persistent contamination is expected, disposable garments should be used. Testing for persistent contamination of protective clothing and appropriate decontamination must be done by qualified laboratory personnel.

10.3.7 Disposal of Contaminated Materials

All materials and equipment used for decontamination must be collected into appropriate containers, labeled and secured for later disposal. Clothing, tools, buckets, brushes, and all other equipment that is contaminated must be similarly secured and labeled. Clothing not completely decontaminated on-site should be secured in plastic bags before being removed from the Site.

Contaminated wash and rinse solutions, if used, should be contained by using step-in containers (e.g., child's wading pool) to hold spent solutions. Another containment method is to dig a trench

about 4 inches deep and line it with plastic. In both cases, the spent solutions should be transferred to drums, which should be labeled and disposed of with other substances off-site.

10.4 MINIMAL DECONTAMINATION

Less extensive procedures for decontamination can be established when disposable clothing and equipment are used, the type and degree of contamination become known, or the potential for transfer is judged to be minimal by the SSO in consultation with the PM.

10.5 CLOSURE OF THE PERSONNEL DECONTAMINATION STATION

All disposable clothing and plastic sheeting used during the operation should be double bagged, labeled, and handled as indicated above. Cloth items should be bagged and removed from the Site for final cleaning. All washtubs, pails, containers, etc., should be thoroughly washed, rinsed, and dried prior to removal from the Site.

10.6 LEVEL C DECONTAMINATION

The maximum decontamination layout for Level C is shown conceptually in Figure 9-1, and sketched in Figure 9-2. A description is given on the following table.

Maximum Measures for Level C Decontamination

Station 1: Segregated Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in plastic-lined containers. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
Station 2: Boot Cover and Glove Wash	2. Scrub outer boot covers and gloves with decontaminate solution or detergent and water.
Station 3: Boot Cover and Glove Rinse	3. Rinse off decon solution from Station 2 using as much water as necessary
Station 4: Tape Removal	4. Remove tape from around boots and gloves and deposit it in the plastic-lined container.

Station 5: Boot Cover Removal	5. Remove boot covers and deposit them in the plastic-lined container.
Station 6: Outer Glove Removal	6. Remove outer gloves and deposit them in the plastic-lined container.
Station 7: Suit and Boot Wash	7. Wash splash suit, gloves, and safety boots. Scrub with long-handled scrub brush and decon solution.
Station 8: Suit, Boot, and Glove Rinse	8. Rinse off decontamination solution using water. Repeat as many times as necessary.
Station 9: Cartridge or Mask Change	9. If worker leaves the Exclusion Zone to change cartridges (or mask), this will be the last step in the decon procedure. After worker's cartridges are exchanged, new outer gloves and boot covers donned, and joints taped, worker returns to duty.
Station 10: Safety Boot Removal	10. Remove safety boots and deposit them in the plastic-lined container.
Station 11: Splash Suit Removal	11. With assistance from the helper, remove splash suit. Deposit it in the plastic-lined container.
Station 12: Inner Glove Wash	12. Wash inner gloves with decon solution.
Station 13: Inner Glove Rinse	13. Rinse inner gloves with water.
Station 14: Face-piece Removal	14. Remove face-piece and deposit it in the plastic-lined container. Avoid touching face with fingers.
Station 15: Inner Glove Removal	15. Remove inner gloves and deposit them in the plastic-lined container.
Station 16: Inner Clothing Removal	16. Remove clothing soaked with perspiration and place it in the plastic-lined container. Do not wear inner clothing off-site because there is a possibility that small amounts of contaminants might have been transferred in removing the fully encapsulating suit.
Station 17: Field Wash	17. Shower if highly toxic, skin-corrosive, or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.
Station 18: Redress	18. Put on clean clothes.

10.7 SANITATION

Potable water will be made available at the Site, either from a pressurized source or commercially available bottled water. Drinking cups will be supplied so personnel will neither drink directly from the source of water nor have to share drinking cups. Drinking cups should be of the disposable variety. Sources of non-potable water will clearly be labeled as such.

Toilet facilities are available on the Site, or portable facilities may be made available for specific projects as convenient. Washing facilities will be provided on the Site, and will be located in the decontamination area or support area. Soap, clean water, washbasins, and single-use towels will be available for personnel use.

10.8 DECONTAMINATION-MEDICAL EMERGENCIES

In the event of physical injury or other serious medical concerns, immediate first-aid is to be administered in lieu of further decontamination efforts.

10.9 DECONTAMINATION OF TOOLS

When all work activities have been completed, contaminated tools used by on-site personnel will be either completely decontaminated or properly disposed, subject to regulatory required characterization as hazardous waste. It is expected that all tools will be constructed of non-porous, non-absorbent materials. This will aid the decontamination process. Any tool, or part of a tool, which is made of a porous/absorbent material will be discarded and disposed of after proper characterization for disposal, if it cannot be properly decontaminated.

Tools will be placed on a decontamination pad or into a bucket and thoroughly washed using a soap solution and brushing, followed by a fresh water rinse. All visible particles are to be removed before the tool is considered clean.

At the direction of the CHSM, the SSO may periodically take wipe samples from decontaminated tools for analysis to evaluate the effectiveness of this program.

11.0 SAFE WORK PRACTICES

11.1 GENERAL

The following general safe work practices will be adhered to during on-site operations:

1. Eating, drinking, or chewing gum or tobacco, and smoking are prohibited in the contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.

2. All personnel will enter designated work areas only through designated entrance/exit to work areas. All personnel leaving an active work zone must exit through the designated entrance/exit and pass through the decontamination station as described in Section 9.0.

3. Personnel will wash their hands and face thoroughly with soap and water prior to eating, drinking, and smoking.

4. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., ground, etc.).

5. All field crewmembers should make use of their senses to alert them to potentially dangerous situations in which they should not become involved (i.e., presence of strong, irritating, or nauseating odors).

6. Only those vehicles and equipment required to complete work tasks should be permitted within the exclusion/work zone (front end loaders, trucks for hauling away scrap metal, excavators, and similar equipment). All non-essential vehicles should remain within the support zone.

7. Containers, such as drums, will be moved only with the proper equipment and will be secured to prevent dropping or loss of control during transport.

8. Field survey instruments, such as PIDs and Flame Ionization Detectors (FIDs), will be covered with plastic or similar covering to minimize the potential for contamination.

9. No matches or lighters will be permitted in the work area/exclusion zone or contamination reduction zone. All CORCO's sites are considered No Smoking areas

10. Contaminated protective equipment, such as respirators, hoses, boots, and disposable protective clothing, will not be removed from the work area or decontamination area until it has been cleaned, or properly packaged and labeled.

11. Prevent, to the extent possible, spillages. In the event that a spillage occurs, contain liquid if possible.

12. Prevent splashing of the contaminated materials.

13. Field crew members will be familiar with the physical characteristics of investigations, including:

- Wind direction in relation to contaminated area;
- Accessibility to equipment and vehicles;
- Communications;
- Areas of known or suspected contamination;
- Site access; and
- Nearest water sources.

14. The number of personnel and equipment in the contaminated area should be minimized but only to the extent consistent with work force requirements of safe Site operations.

15. All wastes generated during activities at the Site will be disposed of as directed by the PM.

16. All personal protective equipment will be used as specified and required.

17. The buddy system will be used at all times when performing sampling for hazardous material when the first action level criteria have been exceeded or when working in remote areas.

18. Personnel are to immediately notify the SSO or SM if any indications of potential explosions or unusual conditions are observed.

19. No one wearing contact lenses or having a beard will be permitted in the work area if Level C or higher protection is required.

11.2 SAMPLING PRACTICES

For all sampling activities, the following standard safety procedures will be employed:

1. All sampling equipment should be cleaned before proceeding to the Site.
2. At the sampling site, sampling equipment should be cleaned after each use.
3. Work in “cleaner” areas should be conducted first where practical.
4. All unauthorized personnel will remain outside exclusion zones at all times.

11.3 HEALTH AND SAFETY EQUIPMENT LIST

- Hardhats;
- Safety glasses;

- Earplugs or muffs;
- Tyvek and polycoated Tyvek (and/or chemically compatible level C) coveralls;
- Chemical resistant steel-toed boots;
- Work gloves;
- Nitrile gloves;
- Surgical vinyl inner gloves;
- Plastic sheeting (visqueen);
- 55 gal 17-H drums (for contaminated solids) and 17-E drums (for liquids);
- Drum liners;
- Barricade tape, fences and barricades;
- Wash tubs and scrub brushes;
- Decon solution (i.e., TSP);
- 5 or 10 gal portable eyewash;
- Respirator sanitizing equipment;
- First aid kit;
- Drinking water;
- Gatorade or similar drink;
- Type ABC fire extinguishers;
- Half-face (NIOSH/MSHA approved);
- Organic vapor cartridges;
- Combustible Gas Indicator and calibration kit;
- Garden sprayer;
- Compressed gas horn (optional); and
- Duct tape.

11.4 BUDDY SYSTEM

Workers will conduct all Site activities with a buddy who is able to:

1. Provide his or her partner with assistance.
2. Observe his or her partner for signs of chemical or heat exposure.

3. Periodically check the integrity of his or her partner's protective clothing.
4. Notify the Site supervisor if emergency help is needed.
5. Prearrange hand signals or other emergency communication signals as prescribed in Section 11.4 of this plan.

12.0 EMERGENCY RESPONSE PLAN

It is standard operating procedure to evacuate personnel from areas involved in hazardous material emergencies and to summon outside assistance from agencies with personnel trained to deal with the specific emergency. This section outlines the procedures to be followed by on-site personnel in the event of a Site emergency. These procedures are to be reviewed during the on-site safety briefings conducted by the SSO.

In the event of a fire or medical emergency, the numbers listed at the front of this Plan can be called for assistance.

12.1 ON SITE DISPENARY AND NEAREST HOSPITAL

The CORCO Peñuelas Facility has an industrial dispensary on site. The industrial dispensary operates during normal working hours. A registered nurse and two emergency medical technicians are available during normal working hours. A physician is available on call for emergencies. The industrial dispensary can accommodate four (4) patients for emergency treatment. A complete stock of medications and supplies for emergencies is available, plus the following:

- Washing and decontamination shower;
- One (1) ambulance
- Two (2) Oxygen Therapy and I.P.P.B. Apparatus (resuscitators),
- One (1) Suction Unit,
- Assorted Rigid and Pneumo Splints,
- Assorted Rescue Apparatus, Scoops, Etc.,
- Two (2) Ambu-Respirators; and
- Eleven (11) oxygen tanks.

Damas Hospital in Ponce, Puerto Rico could be used for more serious cases. From the CORCO Site, travel eastbound on State Road 127 to Tallaboa, then Highway 2 East to Ponce. Take the Ponce by Pass east to exit left. Damas Hospital is located a distance of about 12 kilometers from the CORCO Facility. See the Hospital Route Map in Appendix D.

First-aiders should be summoned in the event of a serious injury; they will arrange to transport the victim to the nearest appropriate facility – onsite Dispensary or nearest hospital. Personnel will be referred to the onsite Dispensary for first aid cases, unless first aid treatment at work site is necessary, for which a first aid kit will be available at the Site. If anyone receives a splash or particle in the eye, the portable eyewash will be used to irrigate the eye for 15 minutes. If direct contact with contaminants occurs, affected skin areas should be washed immediately with soap and water.

In the event of serious trauma or unknown chemical exposure, the employee should be stabilized by one group of employees while the emergency phone number list is consulted and an ambulance immediately requested.

Workers with suspected back or neck injuries are **NOT** to be moved until professional emergency assistance arrives.

At least one person at the Site will have current certification in First Aid and Cardiopulmonary Resuscitation (CPR).

12.2 PLACES OF REFUGE

In the event of a Site emergency requiring evacuation, all personnel will evacuate to a pre-designated area located in the support zone, a safe distance from the exclusion zone boundary ("hot lines"). The SSO will designate the assembly area prior to the start of work.

12.3 FIRE OR EXPLOSION

Whenever the possibility of a fire or explosion exists which could affect field investigation personnel or adjacent work area personnel, or which could occur as the result of the

investigation, an emergency action plan is prepared as part of the task specification. The emergency action plan includes the following:

- Training is provided to employees by the SSO, including how and when to use the equipment, and evacuation drills; and

- The primary and alternate evacuation routes and places of assembly are posted at the Site.

Subcontractors are to be made aware of the provisions of the emergency action plan and should be trained accordingly by the SSR.

To protect against fires, the following special precautions must be taken:

- Before any flame-producing devices, i.e., cutting torches or welding irons, are used in the work zone, the SSO must be contacted. A detailed inspection of the work area will be conducted to determine if potential fire sources exist. The fire sources must be removed to at least 35 feet away before work can commence;

- Two full 20 pound ABC fire extinguishers or equivalent must be located at the work area when cutting/welding is being conducted; and

- Upon completion of the cutting activities the area will be inspected for hot metal, slag, etc.

Type ABC fire extinguishers will be available on-site to contain and extinguish small fires. The local fire department should be summoned in the event of any fire on-site. If it is safe to do so, Site personnel may:

- Use fire-fighting equipment available on-site to control or extinguish the fire if properly trained and designated for that task; and/or

- Remove or isolate flammable or other hazardous materials that may contribute to the fire.

12.4 COMMUNICATION

A communication network must be set up to alert Site personnel of emergencies and to summon outside emergency assistance. Where voice communication is not feasible, an alarm system (i.e., sirens, horns, etc) should be set up to alert employees of emergencies. Radio communication may also be used to communicate with personnel in the exclusion zone. Where phone service is not readily available, radios or portable phones should be used to communicate with outside agencies. Site personnel should be trained on the use of the Site emergency communication network. Emergency phone numbers should be posted at the phone or radio used for outside communication. The SSO is responsible for establishing the communication network prior to the start of work, and for explaining to all Site personnel during the Site safety briefing.

The following hand signals will be used by personnel in the event of an emergency:

Signal	**Definition**
Hands clutching throat	Out of air/can't breathe
Hands on top of head	Need assistance
Thumbs up	OK/ I'm alright/I understand
Thumbs down	No, negative
Arms waving upright	Send back support
Grip partner's wrist	Exit area immediately

12.5 SAFETY EYEWASH

A 10-gallon, 15-minute safety eyewash or equivalent will be available at the Site for the sole purpose of flushing foreign particles or contaminants out of eyes. The SSO will demonstrate the proper operation of the unit prior to the start of work. If the 10-gallon unit is cumbersome, two 5-gallon units may be used.

12.6 INCIDENT REPORT

In the event of an injury or illness, work is to be stopped until the SSO and the PC have determined the cause of the incident and have taken the appropriate action. Any injury or illness, regardless of severity, is to be reported on the Accident Report Form (see Appendix E).

12.7 OPERATION SHUTDOWN

Under certain extreme hazardous situations the on-site SSO or PC may request that Site operations be temporarily suspended while the underlying hazard is corrected or controlled. During operation shutdown, all personnel will be required to stand upwind to prevent exposure to fugitive emissions. The SSO will have ultimate authority for operations shutdown and restart.

12.8 SPILL OR HAZARDOUS MATERIALS RELEASE

Small spills will be immediately reported to the SSO and are dealt with according to chemical manufacturers' recommended procedures. Spills or release of hazardous materials which result in human exposure or off-site environmental contamination will be promptly reported as per current Facility Response Plan (FRP) in effect and appropriate measures are taken to contain and/or collect the material for approved storage and disposal. Where spills, leaks, or ruptures may occur, adequate quantities of spill containment equipment (absorbent pillows, etc.) will be stationed in the immediate area. The spill containment program must be sufficient to contain and isolate the entire volume of hazardous substances being transferred. Drums or containers that cannot be moved without failure will be emptied into a sound container. Fire extinguishing equipment will be on hand and ready to use if needed to control incipient fires.

12.9 EMERGENCY MEDICAL TREATMENT PROCEDURES

Any person who becomes ill or injured in the work zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket). First aid should be administered while awaiting an ambulance. All injuries and illnesses must be reported immediately to the PM.

Personnel who are transported to a clinic or hospital for treatment should take with them information on the chemical(s) they have been exposed to at the Site. This information is included in Section 5.1 of this Plan.

Any vehicle used to transport contaminated personnel will be treated and cleaned, as necessary.

12.10 EXPOSURE TO BLOODBORNE PATHOGENS

For purposes of this health and safety plan, personnel fall into the category for jobs where required tasks normally do not but could involve exposure to blood, bodily fluids, or tissues for example, in the event first aid or CPR is required. If exposure to blood, bodily fluids, or tissues occurs, Universal Precautions such as the following will minimize the chance of contracting disease.

- Wash hands with soap and water as soon as possible after contact with blood, bodily fluids, or human tissue from an injured worker. When hand-washing facilities are not readily available, antiseptic hand cleansers in conjunction with clean cloth/paper towels will be used and hands should be washed with soap and water as soon afterwards as possible;

- Wear gloves when anticipating contact with blood, bodily fluid, tissues, mucous membranes, or contaminated surfaces, or if breaks in the skin are present;

- Wear appropriate protective equipment at all times, including a mask and eye protection, if aerosolization or splattering is likely to occur when attending to an injured worker or when conducting normal work routines;

- Insure that mouthpieces and appropriate personal protective equipment are readily available in first aid kits;

- Report immediately to the SSO all sticks or cuts, mucosal splashes, or contamination of open wounds with blood or bodily fluids; and

- Dispose of all spills, which contain or may contain biological contaminants in accordance with policies for hazardous waste disposal. Until cleanup is complete, an accident area should be roped off from other workers.

The following work practice controls will also be used to eliminate or minimize employee exposure. Where occupational exposure remains after instituting these controls, personal protective equipment will also be used.

- Ingestion of blood borne pathogens - Eating, drinking, smoking, applying cosmetics, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure. Food and drink will not be kept in refrigerators, freezers, shelves, and cabinets or on counter tops or bench tops where blood or other potentially infectious materials are present, nor will food and drink be kept in the same refrigerators as samples. Samples will be stored in coolers or taken directly to the laboratory.

- If handling potentially infectious bodily parts following dismemberment in an accident, specimens of blood or other potentially infectious materials will be placed in a container, which prevents leakage during collection, handling, processing, storage, transport, or shipping. The container will be labeled or color coded according to labeling requirements and closed prior to storage, transportation, or shipping. If outside contamination of the primary container occurs, the primary container will be placed within a secondary container that is puncture-resistant in addition to the above characteristics.

- Equipment (such as drill rigs or equipment used in first aid response) which may become contaminated with blood or other potentially infectious materials will be examined prior to servicing or shipping and decontaminated as necessary, unless the Site supervisor determines that decontamination of such equipment is not feasible. A readily observable biohazard label will be attached to the equipment stating which portions remain contaminated. The Site Supervisor will insure that this information is conveyed to all affected employees, the servicing representative and/or manufacturer as appropriate, prior to handling, servicing or shipping so that appropriate precautions may be taken.

12.10.1 Personal Protective Equipment

Appropriate personal protective equipment will be provided, such as gloves and mouthpieces in the first aid kit.

- All emergency first aid kits will contain red biohazard bags to contain waste created in first aid/emergency situations.
- Gloves will be worn at all times;
- Containers will not be overfilled;
- Containers will be tightly closed or sealed prior to transportation; and
- Pools of blood, bodily fluid, tissue, or spills from biohazard waste containers will be cleaned up with sodium hypochlorite or Clorox bleach, 1 part to 10 parts water.

Gloves

Gloves shall be worn when it can be reasonably anticipated that the employee may have hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin.

Disposable (single use) gloves such as surgical or examination gloves shall be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised. Disposable (single use) gloves shall not be washed or decontaminated for re-use.

Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration or when their ability to function as a barrier is compromised.

Masks, Eye Protection, and Face Shields

Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, shall be worn whenever splashes, spray, spatter, or droplets

of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated.

Gowns, Aprons, and Other Protective Body Clothing

Appropriate protective clothing such as, but not limited to, gowns, aprons, lab coats, clinic jackets, or similar outer garments shall be worn in occupational exposure situations. The type and characteristics will depend upon the task and degree of exposure anticipated.

Surgical caps or hoods and/or shoe covers or boots shall be worn in instances when gross contamination can reasonably be anticipated (e.g., autopsies, orthopedic surgery).

Use

The employer shall ensure that the employee uses appropriate personal protective equipment unless the employer shows that the employee temporarily and briefly declined to use personal protective equipment when, under rare and extraordinary circumstances, it was the employee's professional judgment that in the specific instance its use would have prevented the delivery of health care or public safety services or would have posed an increased hazard to the safety of the worker or co-worker.

When the employee makes this judgment, the circumstances shall be investigated and documented in order to determine whether changes can be instituted to prevent such occurrences in the future.

Accessibility

The employer shall ensure that appropriate personal protective equipment in the appropriate sizes is readily accessible at the worksite or is issued to employees. Hypoallergenic gloves, glove liners, powderless gloves, or other similar alternatives shall be readily accessible to those employees who are allergic to the gloves normally provided.

Cleaning, Laundering, and Disposal

The employer shall clean, launder, and dispose of personal protective equipment at no cost to

the employee.

Repair and Replacement

The employer shall repair or replace personal protective equipment as needed to maintain its effectiveness, at no cost to the employee. If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible.

All personal protective equipment shall be removed prior to leaving the work area.
When personal protective equipment is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal.

Post Exposure

When an exposure incident is reported, the PM will complete Incident Report Form and will immediately refer the employee for a confidential post exposure medical evaluation and follow-up. This will be made available within a reasonable time (preferably 1-2 hours) and location, and performed by or under the supervision of a licensed occupational physician.

12.10.2 Decontamination of Equipment

The following are required for decontamination of equipment:

- Clean spills from around equipment immediately;

- Employees engaged in cleaning equipment will use personal protective equipment that will insure that there is no contact of potentially contaminated material with skin or personal clothing;

- Clean large equipment with a germicidal detergent or bleach (1 part to 10 parts water), avoiding splatter or dripping. If dripping is reasonably anticipated, use a drop cloth under the equipment being cleaned;

- Wipe contamination from small, reusable equipment. Label the equipment with warning labels indicating which parts are contaminated before sending it to an appropriate location for reprocessing;

- All cleaning materials and personal protective equipment will be disposed of as infectious waste or properly prepared for transport to a laundry as potentially infectious laundry; and

- Wash hands with soap and water after removal of personal protective equipment. If as described earlier hand washing facilities are not readily available, antiseptic hand cleansers in conjunction with clean cloth/paper towels will be used and hands should be washed with soap and water as soon after as possible.

12.11 COMMUNITY SAFETY

There is a low potential for migration of chemicals from the Site as a result of "affected activities. In the unlikely event that significant release of contaminants occur during the course of the field work, notification and response activities will follow current FRP in effect.

12.12 EMERGENCY RECOGNITION

This HSP provides listings of chemical and health hazards on-site. Personnel should be familiar with techniques of hazard recognition from pre-assignment training and site-specific briefings. The PC should ensure that the proper prevention devices or equipment are available to personnel.

In an emergency, personnel should proceed to the closest exit with their buddies and go to the safe distance area associated with the evacuation route. Personnel should remain at that area until an authorized individual provides instructions.

13.0 RECORD KEEPING

The PC and SSO have primary responsibility to assure proper Site record keeping. Prior to the start of work, they will review this plan; if there are no changes to be made, they will sign the approval form and forward a copy to the PM.

All on-site personnel will review the HSP and sign the Safety Plan Compliance Agreement in Appendix B to this Plan; copies of these forms will be forwarded to the PM.

Records of all training sessions will be maintained. These will include, the dates of the training sessions, the contents and a brief description of these training sessions.
The names and qualifications of persons conducting the training and the names and job titles of all persons attending the training sessions.
Training records shall be maintained for 3 years from the date on which the training occurred.

The SSO will verify the conducting of a Site Safety Briefing in accordance with Section 16 prior to each shift and have all attendees sign the form in the Appendix A to this Plan; copies will be forwarded to the PM.

Any accident or exposure incident will be investigated and the form in the Appendix E to this Plan will be completed and forwarded to the PM as soon as feasible.

All instrument readings and calibrations, PPE use and changes, health and safety-related issues, and deviations from or problems with this HSP will be recorded in the field log book. These portions of the log will be transmitted to the PM for review at the completion of field operations.

14.0 TOXIC SNAKE AND INSECT BITES AND PLANTS

14.1 SNAKEBITES

Snakes in Puerto Rico will avoid confrontation with man whenever possible, but may not hesitate to bite if cornered or restrained. Although no snakes in Puerto Rico are considered venomous, the bite of some species, particularly the Puerto Rican *Alsophis portoricensis*, has infrequently resulted in sending hypersensitive individuals to seek treatment. Generally, an adult, healthy human is not at any serious risk from a snake bite in Puerto Rico. If a snake is encountered during work at CORCO, do not attempt to corner or restrain it. In the unlikely event of a bite, the bitten individual should be treated by a physician to prevent infection and complications.

14.2 POISONOUS INSECT BITES

Spiders

Spiders in the Puerto Rico are generally harmless, with one notable exception: the Brown Recluse or violin spider (Lox Osceles Reclusa). The bite from the Brown Recluse produces an ulcerous wound called a necrotic lesion that turns dark within a day and takes a long time to heal. Victims should seek medical attention. The sting of West Indian species of tarantula can be painful, but none are known to be fatal to humans.

Scorpions

Scorpions inject venom through a stinger in the tail. In bites from the more dangerous species, there are marked systemic effects within 1 to 2 hours. Fatalities have been recorded. The symptoms of a scorpion bite are: excruciating pain at the site of the sting, nausea and vomiting, abdominal pain, shock, and possible development of convulsions and coma.

Centipedes

The sting of local centipedes is painful and may in rare cases require medical treatment.

General First Aid for Poisonous Insect Bites:

1. Minor bites and Stings
    - Cold applications
    - Soothing lotions, such as calamine

2. Severe Reactions
    - Give artificial respiration if indicated.
    - Apply a constricting band above the injection site on the victim's arm or leg (between the site and the heart). Do not apply tightly. You should be able to slip your index finger under the band when it is in place.
    - Keep the affected part down, below the level of the victim's heart.
    - If medical care is readily available, leave the band in place; otherwise, remove it after 30 minutes.
    - Apply ice contained in a towel or plastic bag, or cold cloths, to the site of the sting or bite.
    - Give home medicine, such as aspirin, for pain.
    - If the victim has a history of reactions to insect bites or is subject to attacks of hay fever or asthma, or if he or she is not promptly relieved of symptoms, call a physician or take the victim immediately to the nearest location where medical treatment is available. In a highly sensitive person, do not wait for symptoms to appear, since delay can be fatal.
    - In case of a bee sting, remove and discard the stinging apparatus and venom sac.

14.3 POISONOUS PLANTS

Characteristic Reactions

The majority of skin reactions following contact with offending plants are allergic and are characterized by general symptoms of headache and fever, itching, redness, and a rash. Some of the most common and most severe allergic reactions result from contact with plants of the Poison Ivy group including Poison Oak and Poison Sumac. The most distinctive features of Poison Ivy and Poison Oak are their leaves, which are composed of three leaflets each. Both plants also have greenish-white flowers and berries that grow in clusters. Such plants produce a severe rash

characterized by redness, blisters, swelling, and intense burning and itching. The victim can also develop a high fever and become very sill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

First Aid Procedure

1. Remove contaminated clothing.
2. Wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
3. Apply calamine or other soothing skin lotion if the rash is mild.
4. Seek medical attention if a severe reaction occurs, or if there is a known history of previous sensitivity.

14.4 MOSQUITO BORNE DISEASES – DENGUE FEVER

Mosquito-transmitted diseases include Dengue, a type of flu that may prove deadly in one of its varieties. Mosquitoes are most prevalent during the rainy seasons. The principal vector mosquito, *Ae. aegypti*, prefers to feed on humans during the daytime and most frequently is found in or near human habitations. There are two peak periods of biting activity, in the morning for several hours after daybreak and in the late afternoon for several hours before dark. The mosquito may feed at any time during the day, however, especially indoors, in shady areas, or when it is overcast. Mosquito breeding sites include artificial water containers such as discarded tires, uncovered barrels, buckets, flower vases or pots, cans, and cisterns.

Dengue fever is characterized by sudden onset after an incubation period of 3–14 days (most commonly 4–7 days), high fever, severe frontal headache, and joint and muscle pain. Many patients have nausea, vomiting, and rash. The rash appears 3–5 days after onset of fever and can spread from the torso to the arms, legs, and face. The disease is usually self-limited, although convalescence can be prolonged. Many cases of nonspecific viral syndrome or even subclinical infection occur, but dengue can also present as a severe, sometimes fatal hemorrhagic disease called DHF. The case-fatality rate for DHF averages 5%.

No vaccine is available. Site personnel should be advised that they can reduce their risk of acquiring dengue by wearing clothing that adequately covers the arms and legs, and applying

insect repellent to both skin and clothing. The most effective repellents are those containing N,N-diethylmetatoluamide (DEET).

Prevention: Avoid Mosquito Bites to Avoid Infection

The chance that any one person is going to become ill from a mosquito bite is low. You can further reduce your chances of becoming ill by protecting yourself from mosquito bites. To avoid mosquito bites:

- Apply insect repellent containing DEET to exposed skin when outdoors. Follow the directions on the product you are using in order to determine how frequently you need to reapply repellent. Sweating, perspiration or getting wet may mean that you need to re-apply repellent more frequently. If you are not being bitten, it is not necessary to re-apply repellent. Repellents containing a higher concentration of active ingredient (such as DEET) provide longer-lasting protection. Do not put repellent on wounds or broken skin.
- Do not breathe in, swallow, or get into the eyes (DEET is toxic if swallowed). If using a spray product, apply DEET to your face by spraying your hands and rubbing the product carefully over the face, avoiding eyes and mouth.
- When possible, wear long-sleeved clothes and long pants treated with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing. Do not apply repellents containing permethrin directly to exposed skin. If you spray your clothing, there is no need to spray repellent containing DEET on the skin under your clothing. If repellent is applied to clothing, wash treated clothing before wearing again.
- After returning indoors, wash treated skin with soap and water.
- Consider staying indoors at dawn, dusk, and in the early evening, which are peak mosquito biting times.
- Limit the number of places available for mosquitoes to lay their eggs by eliminating standing water sources from around your work area.

14.5 AFRICANIZED HONEYBEES

Africanized Honey Bees (AHBs or "killer bees" have been reported at some locations throughout Puerto Rico, and their presence has been documented at the CORCO facility. AHBs are descendants of southern African bees imported to South America in 1956. Brazilian scientists were attempting to breed a honeybee better adapted to the tropics. Unfortunately, some of the bees escaped quarantine and began breeding with local Brazilian honeybees. Since 1957, the Africanized honeybees have vigorously multiplied and extended their range throughout South, Central, and North America and the Caribbean at rates ranging 100 to 300 miles per year.

Africanized bees are less selective than native bees when choosing nesting sites. Many natural and man-made objects have been colonized by AHB swarms in both rural and urban habitats. Examples include cavities in hollow trees and rock walls, sheds, porches, crawl spaces, attics and utility meter boxes. Even trash cans, discarded automobile tires and abandoned cars have been selected by swarming bees as a suitable harborage.

Africanized bees sometimes attack people and animals who unwarily stray into the territory they defend around their nests. AHBs may respond aggressively to everyday occurrences such as vibrations generated by passing vehicles, power equipment, and even foot traffic. When provoked, the bees will wander as far as a quarter mile from their nest to chase an intruder.

Many serious stinging incidents have resulted in life-threatening injury and death. Though their venom is no more potent than that of the European honeybee, AHBs respond in greater numbers and pursue intruders for greater distances. Also, disturbed colonies may remain agitated for as long as 24 hours, attacking perceived threats up to a quarter mile from the hive. Any person or animal in the patrolled area is vulnerable. THE NEST SHOULD NOT BE DISTURBED. If a colony must be removed to facilitate tank closure activities, it should only be removed by a qualified bee removal service or professional exterminator.

Experts agree that the best method of escaping an AHB attack is to cover your face with your hands and run for cover as fast as you can in as safe a manner as possible. Do not scream or

wave your arms, as this will keep the bees attacking. Look for shelter, such as a building or vehicle.

If someone has been stung several times, they should seek medical attention. A single AHB sting can yield almost 0.1 mg of venom and it is widely accepted 500 or more stings can be life threatening to an adult. Less than 1 percent of the population has a systemic allergy to bee stings. Symptoms of a systemic allergy, obvious within 20 minutes of the sting, may include swelling of tongue or throat, hives, dizziness or difficulty with breathing, loss of consciousness. If a systemic allergy is suspected in a stung individual, an ambulance should be summoned immediately. All on-site CORCO and subcontractor employees with known bee sting allergies must carry a bee sting kit prescribed by his/her doctor.

Don't let stingers remain in the skin, because venom can continue to pump into the body for up to 10 minutes. Remove stingers as quickly as possible by scraping them in a sideways motion with a fingernail, blunt knife blade, the edge of a plastic credit card, or similar material. Attempting to remove bee stingers with fingers or a pair of tweezers only forces any remaining toxin within the venom sac into the victim's body. Ice packs may reduce swelling, and a sting-kill ointment may provide pain relief.

14.6OTHER PESTS

A species of mongoose (*mangosta*) thrives in the countryside. They are often referred to incorrectly as *ardillas* (squirrels). Some learn to approach humans for food scraps. They should not be fed and it is advisable to stay away from them. Their bite can infect a person with rabies. The bite should be treated immediately by a physician.

15.0 FORMS

The following forms will be provided to the SSO during final preparations for departure to the job site:

- Daily Instrument Calibration Check sheet;
- Air Monitoring Data Sheet;
- Plan Acceptance Form;

- Plan Feedback Form;
- Accident/Incident Report Form; and
- Site Safety Briefing Form.

All employees working at the Site will fill out the Plan Acceptance Form. The Plan Feedback Form will be filled out by the SSO and any other on-site employee who wishes to fill one out. The Accident Report Form will be filled out by the PM if an accident occurs. The Site Safety Briefing Form will be filled out by the SSO and signed by all persons who received the Site Safety Briefing.

All completed forms should be returned to the office CHSM for retention in project files.

16.0 EMPLOYEE TRAINING

16.1 GENERAL

All employees working on-site who are exposed to hazardous substances, health hazards, or safety hazards; their supervisors; and the management responsible for the Site must receive training before they are permitted to engage in an "affected activity" that could expose them to hazardous substances or safety or health hazards. Employees will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility.

All on-site personnel shall be trained on the contents of this HSP and be familiar with the requirements of the plan. The PM and PC will be responsible for implementation of personnel HSP training.

The PM will maintain current copies of training certificates and statements of medical program participation for all Site personnel.

In addition, all on-site personnel will review this HSP and sign a copy of the Safety Plan Compliance Agreement, which is found in Appendix B to this Plan. The PM will maintain these

agreements in the office in Peñuelas, and forward them to the PM at the conclusion of the operation.

Prior to the start of operations at the Site, the SSO will conduct a Site Safety Briefing, which will include all personnel involved in Site operations. At this meeting, the SSO will discuss:

- Contents of this HSP;
- Types of hazards at the Site and means for minimizing exposure to them;
- The type of monitoring that will be performed;
- Action levels for upgrade and downgrade of personal protective equipment;
- Personal protective equipment that will be used;
- Decontamination protocol;
- Site control measures, including safe operating practices and communication;
- Location and use of emergency equipment; and
- Evacuation signals and procedures.

Subsequent Site Safety Briefings will be conducted prior to each shift to review pertinent safety issues, discuss any problems, and outline safety aspects of the shift's tasks.

For each briefing, the SSO will complete a Site Safety Briefing Form (see Appendix A to this Plan) and submit each on a regular basis to the CHSM.

16.2 INITIAL TRAINING

General workers engaged in general soil disturbance work that could expose workers to hazardous substances and health hazards will receive the minimum training specified in section 15.1 above.

16.3 SUPERVISOR TRAINING

On-site supervisors directly responsible for, or who supervise these employees will receive the minimum training described in Section 15.1 above, and at least the 10-hour OSHA course for construction, or its equivalent.

16.4 REFRESHER TRAINING

Employees and managers will receive pertinent refresher training annually.

15.5 ADDITIONAL TRAINING REQUIREMENTS

It is desirable to have access during working hours to on-site employees certified in both first aid and cardiopulmonary resuscitation.

DOT requires that employees who directly affect the safety of hazardous material transportation receive General Awareness/Familiarization, Function-Specific, Safety, and (where applicable) Driver training. Those who ship any DOT hazardous materials, such as calibration or decontamination chemicals or preservatives or samples that are DOT hazardous, must have this training. Awareness level training is provided during the 8-hour Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) refresher courses.

17.0 MEDICAL SURVEILLANCE

No individual will participate in on-site activities in which a potential exposure or injury could occur unless a competent medical professional has determined that the individual is medically qualified to perform field activities with potential for exposure to hazardous substances activities and medically qualified to use respiratory protection.

APPENDICES

Appendix A

Site Safety Briefings

Appendix A

Site Safety Briefings

Job Name: _____

Job No.: _____ Date: _____

Start Time: _____ Completed: _____

Site Location: _____

****

SAFETY ISSUES

Tasks (this shift) _____

Protective Clothing/Equipment _____

Chemical Hazards _____

Physical Hazards _____

Control Methods _____

Special Equipment/Techniques _____

Nearest Phone _____

Hospital Name/Address _____

Special Topics (incidents, actions taken, etc. _____

_____

_____

_____

****

ATTENDEES

Print Name	Sign Name
_____	_____
_____	_____
_____	_____
_____	_____

Meeting conducted by:_____

Appendix B

Safety Plan Compliance Agreements

August 2013

Appendix B

Safety Plan Compliance Agreements

For

Health and Safety Plan

CORCO Facility Site

Peñuelas, Puerto Rico

General Construction and Maintenance Activities

I, _____, have been briefed on the contents of the Health and Safety Plan for the Project. I have reviewed the plan, understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the plan.

Signed: _____ _____

Signature – Project Coordinator (Date)

Firm: _____

Subcontractor
Statement of Compliance

This is to confirm that the employees listed below are qualified by virtue of training and experience to engage in field activities at the CORCO Facility Site in connection with the Contract/Subcontract Agreement/Purchase order _____, dated _____, 200__. Further, all said employees have been determined to be properly trained and medically fit to perform those activities prescribed by said contract and to use the respiratory protective equipment necessary to perform the job safely in accordance with 29 CFR 1910 and 1926 and any other Federal, State, or local requirements.

Subcontractor Employee Names

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

_____
Authorized Subcontractor Representative

_____
Printed Name

Appendix C

Heat Stress Guidance

August 2013

Appendix C

The following sections describe the signs and symptoms of heat stress.

Heat Stress

Wearing PPE also puts a worker at a considerable risk of developing heat stress. This can result in health effects ranging from heat fatigue to serious illness or death. Consequently, regular monitoring and other precautions are vital.

For workers wearing standard work clothes, recommendations for monitoring and work/rest schedules are those approved by ACGIH and NIOSH. Workers wearing semi-permeable PPE or impermeable PPE should be monitored when the temperature in the work area is above 70°F. To monitor the worker, the following should be measured:

- Heart rate – the radial pulse should be counted during a 30-second period as early as possible in the rest period.
    - If the heart rate exceeds 110 beats per minute at the beginning of the rest period, the next work cycle should be shortened by one third and the rest period should be kept the same.
    - If the heart rate still exceeds 110 beats per minute at the next rest period, the following work cycle should be shortened by one third.

- Oral temperature – A clinical thermometer (3 minutes under the tongue) or similar device should be used to measure the oral temperature at the end of the work period (before drinking).
    - If the oral temperature exceeds 99.6°F (37.6°C), the next work cycle should be shortened by one third, without the rest period being changed.

- If the oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, the following work cycle should be shortened by one third.
- A worker should not be permitted to wear a semi-permeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).

- Body water loss, if possible – Weight should be measured on a scale accurate to +/- 0.25 pound at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing. The body water loss should not exceed 1.5 percent of total body weight loss in a workday.

Initially, the frequency of monitoring depends on ambient temperature. The length of the work cycle is determined by the frequency of physiological monitoring described above.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important, because once someone suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat injuries. To avoid heat stress, the following steps should be taken:

- Work schedules should be adjusted.
- Shelter (air-conditioned if possible) or shaded areas should be provided to protect personnel during rest periods.
- Workers' body fluids should be maintained at normal levels to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat – i.e., 8 fluid ounces (0.23 liter) of water must be ingested for approximately every 8 ounces (0.23 kilogram) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, the worker should be encouraged to drink more. The following strategies may be useful:

- Water temperature should be maintained at 50°F to 60°F (10° to 15.6°C).
- Small disposable cups that hold about 4 ounces (0.1 liter) should be provided.

Signs and Symptoms of Heat Stress

Heat rash may result from continuous exposure to heat or humid air.

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

- Muscle spasms
- Pain in the hands, feet, and abdomen

Heat exhaustion occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, and moist skin
- Heavy sweating
- Dizziness, fainting, and nausea.

Heat stroke is the most serious form of heat stress. Temperature regulation fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms include:

- Red, hot, and unusually dry skin
- Lack of or reduced perspiration
- Dizziness and confusion

- Strong, rapid pulse and coma.

Have workers drink 16 ounces (0.5 liter) of fluid (preferably water or diluted drinks) before beginning work. Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day is recommended, but more may be necessary to maintain body weight.

Encourage workers to maintain an optimal level of physical fitness. Where indicated, acclimatize workers to site work conditions.

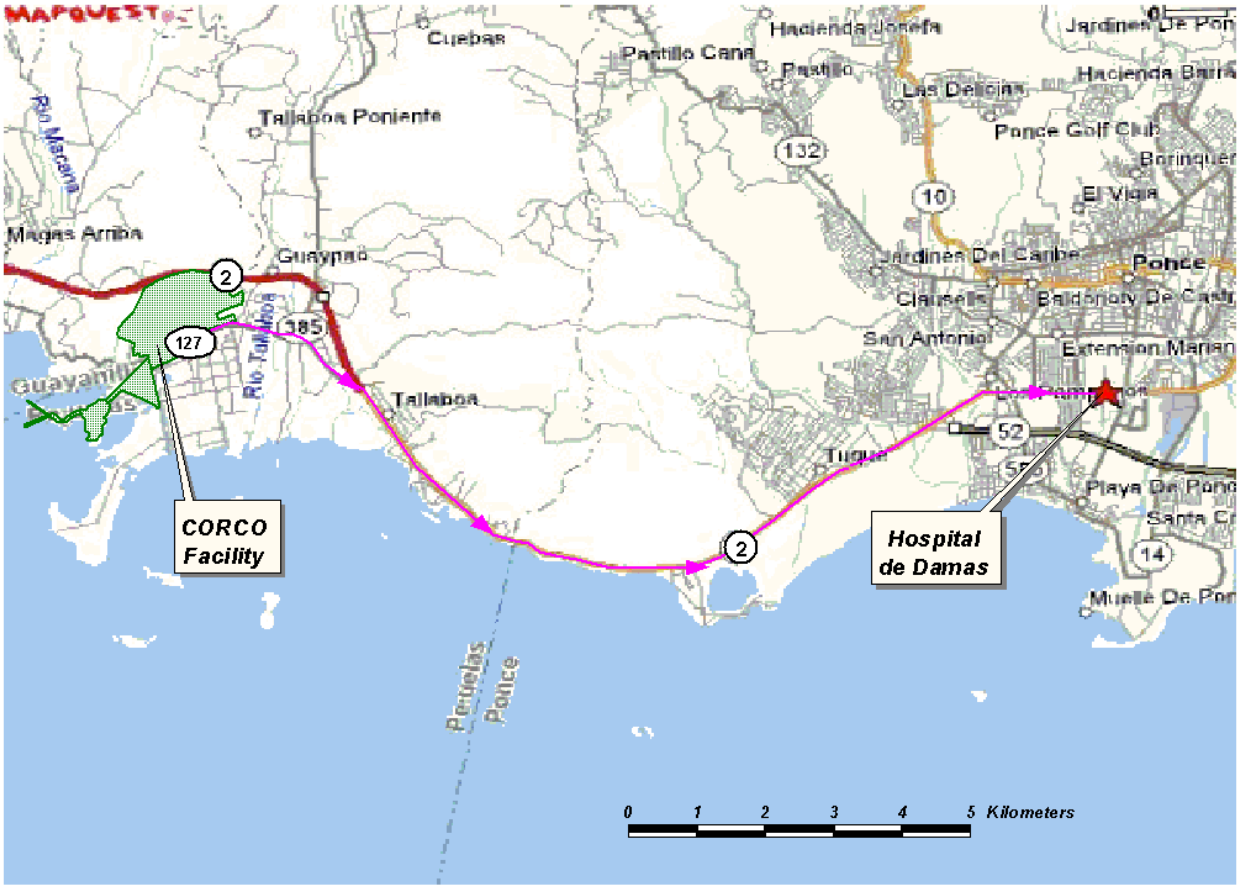
Provide cooling devices to aid natural body heat exchange during prolonged work or severe heat exposure.

Train workers to recognize, identify, and treat heat stress.

Appendix D

Hospital Route Map

Appendix D


MAPQUEST
Cuebas
Pantillo Cana
Pantillo
Hacienda Josefa
Las Delicias
Ponce Golf Club
Hacienda Buena
Jardines De Ponce
Borinquen
El Vigia
Talaboa Poniente
Rio Macana
Magas Arriba
Guaynao
Jardines Del Caribe
Ponce
Canas
Baldorioty De Castro
San Antonio
Extension Marian
Talaboa
Rio Talaboa
Guayanilla
Tuque
Playa De Ponce
Santa Cruz
Muelle De Ponce
Penuelas
Ponce
CORCO Facility
Hospital de Damas
0 1 2 3 4 5 Kilometers
2
127
385
132
10
52
14

Hospital Route Map

Start: CORCO Terminal, Carr. 127, Km. 17.3, Peñuelas, PR 00728
End: Hospital de Damas, 2213 Ponce by Pass, Ponce, Puerto Rico
Total Distance: 12 Kilometers
Estimated Travel Time: 15 Minutes

From the CORCO Site, travel eastbound on State Road 127 to Tallaboa, then Highway 2 East to Ponce. Take the Ponce by Pass east to exit left. Damas Hospital is located a distance of about 12 kilometers from the CORCO Facility.

Appendix E

Incident/Accident Report Form

August 2013

Appendix E (Page 1)

Accident/Incident Report Form

Administrative Information:

Company: _____

Project: _____

Project No.: _____

Date & Time of Accident/Incident: _____

Location: _____

Client: _____

Injuries/Illnesses:

Name of Injured Employee: _____ Age: _____

Job Function/Title: _____ Phone No.: _____

Sex: Male_____ Female_____

Did Employee see a Doctor: Yes_____ No_____ (If Yes attach a Doctors Report)

Describe the Injury: _____

_____

_____

_____

_____

Type of Accident/Incident

(Check all applicable items)

_____Injury _____Illness _____Property Damage

_____Property Damage _____Vehicular Accident _____Spill/Release

_____Fire, Explosion, Flash _____Unexpected Exposure

_____Other (Describe) _____

DESCRIPTION OF ACCIDENT/INCIDENT: _____

_____

_____

_____

_____

_____

_____

(Describe the facts contributing to the Accident/Incident. Identify individuals involved, witnesses, companies, phones numbers, etc. Attach additional sheets as needed. Attach drawings and photos.)

Appendix E (Page 2)

Accident/Incident Report Form

Prepared By:

Name: _____

Date: _____

Signature: _____

(The Individual who prepares this report shall report the accident/incident as soon as practical to the SSO. If the person who prepares this report is the SSO, he/she shall report to the CHSM and the PM. The written report shall be given to the aforementioned individuals within 24 hours for accidents/incidents for medical treatment and within five days for other incidents.)

Reviewed By:

_____ _____

Name (SSO) Date

_____

Signature

_____ _____

Name (PM) Date

_____

Signature

_____ _____

Name (CHSM) Date

_____

Signature

Distribution:

- Project Files
-

Corrective Actions: (Internal Use) _____

_____

_____

_____

_____

_____

Figures

Figure 9-1: Minimum Decontamination Layout

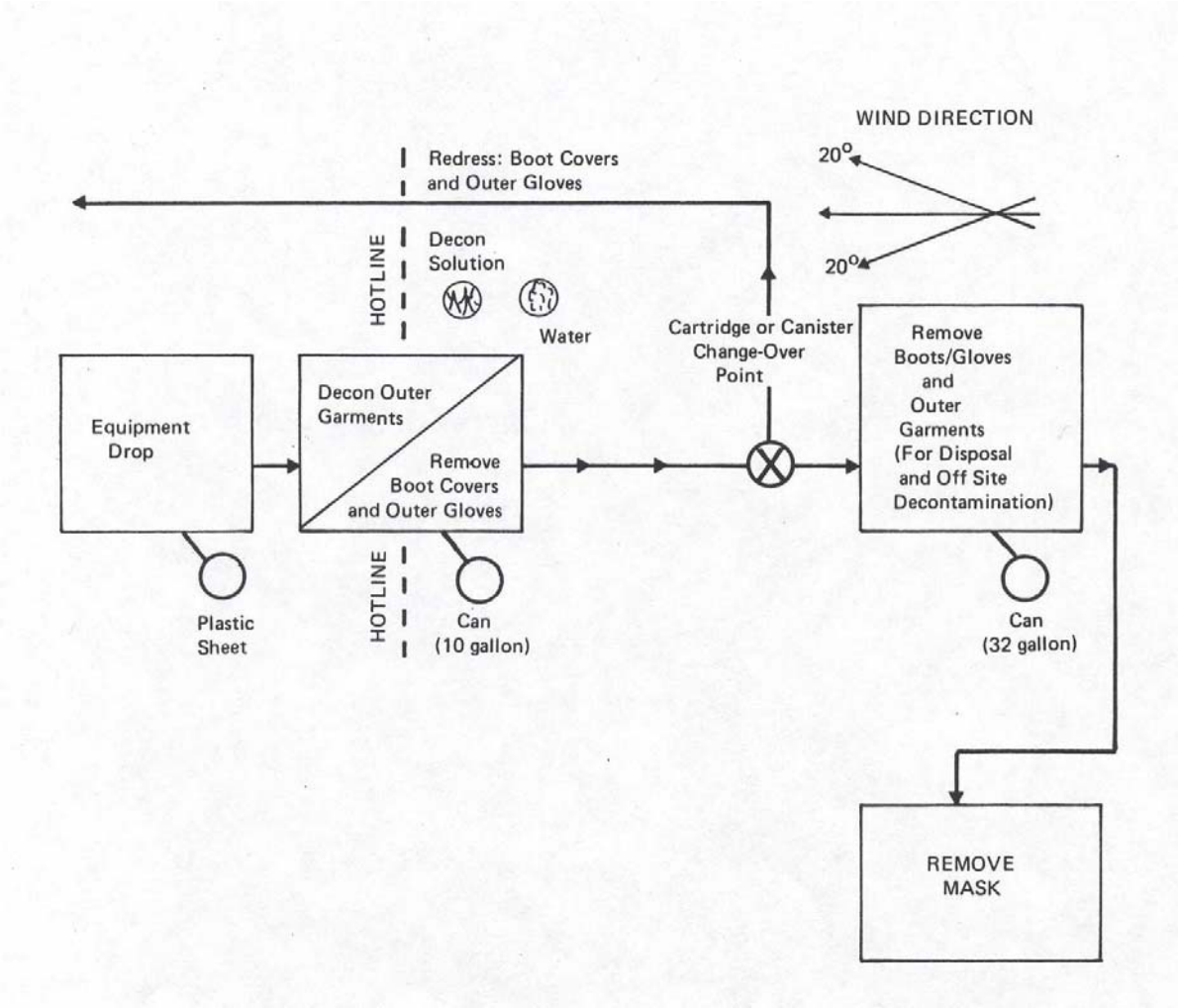


Figure 9-2: Layout of Personnel Decontamination Station